PB-229 626

IN THE MATTER OF POLLUTION OF THE NAVIGABLE WATERS OF PEARL HARBOR AND ITS TRIBUTARIES IN THE STATE OF HAWAII HELD AT HONOLULU, HAWAII ON SEPTEMBER 21, 22, AND 23, 1971. TRANSCRIPT OF PROCEEDINGS

Environmental Protection Agency
Washington, D. C.

1971

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PROCEEDINGS

OAHU
Pearl Harbor

September 21, 22, 23, 1971
Honolulu, Hawaii

CONFERENCE
In the matter of Pollution of the Navigable Waters of Pearl Harbor and its Tributaries-Hawaii

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CONFERENCE

IN THE MATTER OF POLLUTION OF
THE NAVIGABLE WATERS OF PEARL HARBOR AND ITS TRIBUTARIES
IN THE STATE OF HAWAII

held in

Honolulu, Hawaii

September 21, 22, 23, 1971

TRANSCRIPT OF PROCEEDINGS

→The report includes statements and discussion on

The conference in the matter of pollution of the navigable waters of Pearl Harbor and its tributaries in the State of Hawaii convened at 9:00 a.m., on September 21, 1971, →for at the Pagoda Hotel, Honolulu, Hawaii.

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ALSO ATTENDING:

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PROCEEDINGS

OPENING STATEMENT

BY

MR. MURRAY STEIN

MR. STEIN: The conference is open.

This conference in the matter of pollution of the navigable waters of Pearl Harbor and its tributaries, involving the State of Hawaii and the U.S. Environmental Protection Agency is being held under the provisions of section 10 of the Federal Water Pollution Control Act.

Under the provisions of the Act, the Administrator of the Environmental Protection Agency is authorized to call a conference of this type when he finds that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution subject to abatement under the Federal Act, and action of Federal, State, or local authorities.

The purpose of the conference is to bring together the State water pollution control agency, representatives of the U. S. Environmental Protection Agency, and other interested parties to review the existing situation and the progress which has been made, to lay a basis for future action by all parties concerned, and to give the State, localities, and industries an opportunity to take any indicated remedial action under State and local law.

Both the State and Federal governments have responsibilities in dealing with water pollution control problems. The Federal Water Pollution Control Act declares that the States have primary rights and responsibilities for taking action to abate and control pollution. Consistent with this, we are charged by law to encourage the States in these activities.

At the same time, the Administrator of the Environmental Protection Agency is charged by law with specific responsibilities in the field of water pollution control in connection with pollution of interstate and navigable waters. The Federal Water Pollution Control Act provides that pollution of interstate or navigable waters, whether the matter causing or contributing to the pollution is discharged directly into such waters, or reaches such waters after discharge into a tributary, which endangers the health or welfare of any persons, shall be subject to abatement.

The October 1965 amendments to the Federal Water Pollution Control Act additionally empower the Administrator to initiate enforcement procedures whenever he finds that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution of interstate or navigable waters, and the action of Federal, State, or local authorities.

This conference on pollution of the navigable waters of Pearl Harbor and its tributaries is the seventh to be held under these shellfish provisions of the Act. Of course, as the representatives of the shellfish industry and some others know, we have a tremendous case in Washington's Puget Sound involving discharges from paper mills and injury to the Pacific oyster industry, but that conference was called on the initiative of the Governor of Washington. Of the six earlier shellfish-provision conferences, I have learned on Long Island Sound, where we get the blue point oysters, and parts of Maine, areas of shellfish are open. Many of those places have been closed for years, so we have been successful in those. In other areas, we have still extensive construction work, and we believe that we will be able to open these areas there also for shellfish. Shellfish is one of the areas where we can really judge our end results; either we get the area open after the conference or after we get all the results from everyone connected there.

Today's conference will cover the effects on interstate commerce caused by pollution of the shellfish beds in Pearl Harbor. We expect the conference will be useful in providing a clear picture of the problem, delineating the progress which has already been accomplished, and in indicating what needs to be done to correct the pollution problem in these navigable waters.

As specified in section 10 of the Federal Water Pollution Control Act, the Administrator has notified the official State water pollution control agency, which is the Hawaii Department of Health, of this conference. The Hawaii Department of Health will be represented by Dr. Walter B. Quisenberry.

The Federal conferee is Mr. Richard O'Connell, Enforcement Officer for our regional office.

My name is Murray Stein. I am the Chief Enforcement Officer -- Water, of the Environmental Protection Agency in Washington, D. C., and the representative of Administrator Ruckelshaus.

The parties to this conference are the official State water pollution control agency and the Environmental Pollution Agency. Participation in this conference will be open to representatives and invitees of these agencies and such persons as inform me that they wish to present statements. However, only the representatives of the State water pollution control agency and the Environmental Protection Agency constitute the conferees.

Now a word about the procedures governing the conduct of the conference. The conferees will be called upon to make statements. The conferees, in addition, may call upon participants whom they have invited to the conference to make statements. In addition, we shall call on other interested individuals who wish to present statements. At the conclusion of each statement, the conferees will be given an opportunity to comment or ask questions, and I may ask a question or two. This procedure has proven effective in the past in reaching equitable solutions in developing the record.

At the end of all the statements, we shall have a discussion among the conferees and try to arrive at a basis of agreement on the facts of the situation. Then we shall attempt to summarize the conference orally, giving the conferees, of course, the right to amend or **modify** the summary.

Under the Federal laws, the Administrator is required at the conclusion of the conference to prepare a summary of it which will be sent to the conferees. The summary, according to law, must include the following points:

1. Occurrence of pollution of navigable waters subject to abatement under the Federal Act;

2. Adequacy of measures taken toward abatement of pollution; and

3. Nature of delays, if any, being encountered in abating the pollution.

The Administration is also required to make recommendations for remedial action if such recommendations are indicated.

A record and verbatim transcript of the conference is being made by Miss Louise Haller. This is being made for the purpose of aiding us in preparing a summary, and also for providing a complete record of what is said here. It usually takes about 3 or 4 months for the transcript to come out in printed form. If you wish a record beforehand, or a portion of it, you can check with the reporter, who is on contract, and make your own arrangements with her. I should indicate that we do not print in color. So take into account that any charts you may present will be reproduced in black and white. Try not to refer to color if you use graphic aids in your presentation as they will be meaningless when the transcript is printed and someone reads it.

We shall make copies of the summary and transcript available to the Hawaii Department of Health. We have generally found that for the purpose of maintaining relationships within the States, the people who wish summaries and transcripts should request them through their State agency rather than come directly to the Federal Government. The reason for this is that, when the conference has been concluded, we would prefer people who are interested in the problem to follow the normal relations in dealing with the State rather than the Federal Government. This has worked successfully in the past and we will be most happy to make this material available for distribution.

I would suggest that all speakers and participants other than the conferees making statements come to the lectern and identify themselves for purposes of the record.

As a personal word, I have been coming back to Hawaii many times. From the earliest days I came here, because of the commission I guess and the right to my job, in coming, I was obviously concerned with pollution. We saw it encroaching in various parts of this lovely island.

If we view this conference as a real opportunity for the State and Federal Government and municipalities and counties, if they are involved, all industries and the Federal installations to get together on this problem, we can make this a very productive conference and we can come up with a program for abating pollution.

I wish to assure you the Federal Government is here to meet you at least half-way. Our hand is out. We ask you to approach us in the same way, and see if we can work out a real equitable and reasonable program to assure that we are going forward and abate any pollution that we find here.

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Opening Statement - Murray Stein

At this point, it is indeed an honor and privilege to call on the first speaker to come to the podium, Congresswoman Patsy Mink.

STATEMENT OF
HONORABLE PATSY MINK
U. S. HOUSE OF REPRESENTATIVES
WASHINGTON, D. C.

PATSY MINK: Thank you very much. Chairman Stein and other members of the conference, other invited guests and members who will be participating. I want to say that as a member of Congress, representing the Second Congressional District in the State of Hawaii, that I am delighted to have this opportunity to be here personally at this conference to express my views and my concurrence on the urgent action required to clean up the waters of Pearl Harbor. I want to take this opportunity, also, to commend the Environmental Protection Agency, led by its able Administrator, the Honorable William D. Ruckelshaus, and the other city, State, and Federal officials who have shown their concern in this important goal by scheduling this meeting, giving the residents of Hawaii an opportunity to participate in this program.

I think the very fact that this conference was convened by all the levels of government involved underlines the importance of the problem that we face. The increasing realization of our people and their elected officials of the gravity of the loss caused by the despoilation of such irreplaceable natural assets as Pearl Harbor has produced agreement by all that something must be done -- and soon.

We cannot afford to wait until the processes of despoilation already begun have run their course and the proof is manifested in the death of sea life in Pearl Harbor. Already, this once-pure body of water is so polluted that it is no longer attractive for human use such as swimming or diving. Scientists say that the dwindling numbers of oysters that can still be taken from Pearl Harbor are unfit for human consumption. This shows how far we have come from the days when oysters thrived in such abundance as to produce the pearls which gave the harbor its name.

Unless we act now, Pearl Harbor will become the cesspool of the Pacific. This national shrine that should stand as a symbol of America's ability to triumph over adversity will blacken and become a monument to our inability to live with nature in an age of technology. What a national tragedy it will be if Pearl Harbor is turned into a dead sea as a result of our careless use of this natural inlet sea.

Yet, it is happening today. The sewage effluent of our growing Leeward community is pouring unabated into these formerly clear waters. Mud and silt from bustling construction rushes down the streams from the surrounding hills to coat and suffocate the bottom. Dump materials drift across the lochs, and oil wastes from ships lap along the shore. Thermal discharges from our industries, radioactive traces, and other debris add to the harvest of pollution.

Over the past year, encouraging efforts have been made to at least begin on programs to reverse these conditions. The Navy, which has jurisdiction over Pearl Harbor, has developed plans for restoring it to the point where it can be open to the public for recreational and other uses. This in itself should spur us to action so that we can enjoy Pearl Harbor rather than continue to have it as a restricted area. The governmental jurisdictions involved have begun to develop plans to speed up previously scheduled cleanup projects. I think this conference can help us crystallize these activities and cut through the obstacles of inertia, red tape, and financing that have hitherto held up progress.

My attention was directed to the plans being made for the disposal of raw sewage into Middle Loch when it was announced this spring that two oxidation ponds were being constructed on the Waipio peninsula in Waipahu. While I am fully in accord with the need for stop-gap measures to provide for the immediate disposal of this sewage, I am nevertheless concerned with statements which were initially made that these ponds were being planned for usage for as long as 10 to 15 years since the projected sewer treatment plant, known as the Honouliuli system, would not be constructed until into the 1980's. I am pleased to note that these projections have now been revised and that plans do call for construction by 1976.

Nevertheless. as a resident of Waipahu, I am here today to express my grave concern for the adequacy of the ponds. Based upon the population of the Waipahu area and the volume of the sewage being pumped into these 2 oxidation ponds. it is my belief that neither the size nor the design are adequate.

The oxidation process depends upon a biological treatment of the sewage in solution and in suspension which must be in delicate balance at all times. Despite all the assurance given by the city officials, I am still of the opinion that the ponds cannot be depended upon to function without causing the people living in the immediate area much distress from odor and increased mosquito contamination.

Therefore the timetable for the construction of a sewer treatment plant is a matter of great urgency. Not only does the sewage flowing into Middle Loch from these oxidation ponds in Waipahu already not meet the water quality standards adopted for this area, but the potential problems of keeping these ponds in ideal textbook biological balance require that this conference pay careful heed to the requirement for early completion of the Honouliuli sewer treatment facility.

Even if the construction of the sewer treatment plant can be completed by 1976, I am hopeful that this conference will assure us enforcement mechanism for the proper operation of these 2 oxidation ponds so that the people of Waipahu and surrounding areas can be protected from the stench and mosquitoes which are potential contaminants if the ponds should become septic or malfunctioning.

Also I believe that it was thoughtless negligence to allow these ponds to be built without fencing to guard against the possibility of children falling into them. Although the pond area is away from the highway, still there is the grave possibility that children might not know what they are. I would urge that adequate fencing be added as an immediate requirement for the public safety.

The sewage treatment requirements for Oahu are indeed tremendous. I am well aware of the need for large sums of money. I am also aware of the lack of Federal money to meet the immediate needs for Sand Island and Kaneohe, as well as the Honouliuli system. But it seems to me that the urgency of these 3 projects require that the State and the city assume greater responsibility and not delay for even a day the completion of all 3 of these projects.

I, therefore, call upon our officials in the State and city to redouble their efforts toward meeting this common goal. If required, I urge that the city and/or the State float bonds to raise the required capital. It will be cheaper in the long run to begin constructing the necessary facilities now rather than wait for Federal funds. I am advised that both the State and city are willing to meet their share of these costs now. The bonds could be floated to advance the payment of the Federal share which would then be repaid as the annual Federal allotments are received.

The cleaning up of Pearl Harbor is primarily the responsibility I feel of the people of this State. Let us meet that responsibility by our own efforts to whatever degree is required. Of greatest importance is the decision that Pearl Harbor must be saved. Once we have agreed to that, all 3 governmental levels can cooperate on the most feasible means of accomplishing our common goal. The end result will be the opportunity for the people of Hawaii to enjoy Pearl Harbor as a recreation area for fishing, swimming, and boating, especially the people in the Leeward community.

It is essential, therefore, that we proceed with an element of urgency.

Once again, I would like to commend the Environmental Protection Agency and our State and city officials and other community groups for participating in this most important conference. I sincerely hope that out of these efforts will come an action program for returning Pearl Harbor to the people for their use and enjoyment. To this end I pledge my complete cooperation.

At this time, I would like to ask that my husband, Mr. John Mink, be permitted to present supplementary testimony in support of our views as residents of the community of Waipahu, and our concern about the oxidation ponds.

MR. STEIN: Without objection, this will be done.

STATEMENT OF
JOHN F. MINK
EARTH SCIENCES GROUP, INC.

MR. MINK: My name is John F. Mink and my home is in Waipahu, Oahu, although in recent years I've been spending most of my time in Washington, D. C. By profession I am a hydrologist, and currently I am an officer of the Earth Sciences Group, Inc., for whom I provide professional competence in matters of water supply development and wastewater disposal. I am here to express my concern over the construction and operation of a 2-pond oxidation lagoon sewage disposal system on Waipio Peninsula which lies within 2,000 feet of the community in which I live.

I recognize the current problem of disposing of the domestic sewage from the Waipahu region and am aware of the manner of disposal that had been practiced prior to the construction of the oxidation ponds on the Peninsula. I have also read statements that the ponds are merely an interim step until a primary-secondary treatment plant is built to serve the Leeward area. However, I am greatly perturbed by two features of the decision to go ahead with the pond: first that the target date for the initiation of construction of the treatment plant is at least 5 years into the future, and second that the size of the recently completed ponds appear to be suboptimum with respect to present sewage loads and will be grossly undersized within a few years as population increases in Waipahu. I fear that the solution to more sewage will be more oxidation ponds, until Waipio Peninsula expands into one giant open-air cesspool.

Oxidation ponds may be the most convenient way to subject sewage to primary and seconday treatment, but their successful operation depends on the delicate interplay of biological and chemical activities to achieve a non-septic equilibrium. The penalty for an improperly acting lagoon includes foul odors, flies, mosquitoes, and an effluent as obnoxious as the sewage that entered the receiving pond. In practice, few lagoons achieve design goals, even without overloading; typically ponds are loaded beyond their design capacities. No one can guarantee that a sewage lagoon will work properly; there are no precise analytical formulations to predict the behavior of such a system. Design is based on experience, guesswork, and rule-of-thumb empiricism.

It is my understanding that the Waipio ponds, each of which covers approximately 5 acres, will receive an average daily input of 2 to 2.5 million gallons of sewage. One of the normal rule-of-thumb formulations states that 1 acre of pond will accommodate the sewage of 250 people; another says that 1 acre will effectively treat 20,000 gallons per day of sewage. For either case, the expected sewage flow of the Waipahu region would take nearly 100 acres of ponds for efficient treatment. A 10-acre facility appears certain to be overloaded; if so, will more ponds be built to handle not only the current but also the anticipated loads a few years hence? Even a conservative design guide of allowing 120 pounds of biochemical oxygen demand per pond acre per day, equivalent to the sewage of about 600 people, would result in overload by a factor of about 3, particularly in view of the fact that the detention time in the ponds will be in the neighborhood of 10 days rather than the recommended 20 to 25 days.

I do not question the integrity of the design of the Waipio ponds, but because so much is expected of so little I would hope that the designers and operators maintain a high level of vigilance so that the delicate operating balances, if ever they are attained, do not degrade to septic conditions. Care also will be required to prevent the breeding of mosquitoes and flies. And it is imperative that the construction of the regional primary-secondary treatment plant be initiated soon, so that the present ponds cease being a menace to our community, and to prestall the temptation to construct even more sewage lagoons as an "interim measure." Thank you.

MR. STEIN: Thank you, Mr. Mink.

As a matter of procedure, I would like to request that anyone who has testimony should give the first copy, in terms of priority, to the reporter. If you have any more, then you can share them with us. This will lessen the chore of the difficulty of reporting.

I also would like to thank Congresswoman Mink and Mr. Mink for their statements, particularly their specifics on the oxidation ponds; and I would invite the Federal and State participants to comment on this, and the

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local government participants who will follow during the course of this, to comment on these ponds, with specific reference to the design, and two, operation, and three, the essential features.

I think these are all concerns in sewage lagoons and ponds that we have wherever we have them; and I think that we have to get at that, because if the ponds are not designed properly, no operation in the world is going to prevent -- and I fully share what you're saying -- the consequences of the malfunction. You're saying, in essence, that we're not dealing with a perfume factory, and if something is built wrong, then it can smell pretty bad.

May we have Mr. Richard K. Sharpless, Managing Director of the City and County of Honolulu?

STATEMENT OF

RICHARD K. SHARPLESS

MANAGING DIRECTOR, CITY AND COUNTY OF HONOLULU

HONOLULU, HAWAII

MR. SHARPLESS: Mr. Chairman, conferees, ladies and gentlemen. I am Richard K. Sharpless, Managing Director of the City and County of Honolulu, representing Mayor Frank F. Fasi.

At the inception, let me make a disclaimer. I am not here at this time as a witness. However, I will be later on. I was asked to extend words of welcome to the conference, and in that role I am responding.

On behalf of all of us out here, five times west of eastern standards, welcome. We have all the problems of any large, urban area. We are fortunate to have this opportunity to acquaint you with one of them: water pollution.

We are glad you are here for several reasons; one, you know a lot more about it than we do, and that's intended sincerely, based on the remarks of your chairman, and with respect to the other conferences, you can see how true this is.

Two, you have more money than we do. Your employer, Mr. Richard O'Connell, has the legal ownership, possession and control of the principal source of tax revenue in this country; that is, income tax, which provides many services which require a large amount of money.

We hope that we can inform you about water pollution on Oahu, and we hope that on the basis of such information you can help us.

May I close by suggesting the name of the conference which is a take-off on one of our well-known organizations in this field. Let's call it the "Save Our Shellfish." Thank you. (Applause)

MR. STEIN: Thank you, Mr. Sharpless.

We do have State Representative Joe Kuroda whom I would like to introduce. Do you have any statements you wish to make?

MR. KURODA: No, sir.

MR. STEIN: We also have State Senator Donald Ching.

MR. CHING: I have no statements.

MR. STEIN: We will now call on the Federal people, but before we do we have an indication that about 15 citizens -- I understand that there are other State legislators here, too, whose names were not given to me, and I would wonder if they wanted to stand up and be recognized.

About 15 people have indicated that they wish to speak. The conference tentative agenda calls for us to make a Federal presentation which will take most of the morning. Then, we were going to call on the State. However, I recognize that many of the people who have registered and taken the time to come here and made an effort to come here, may be required to possibly make their presentations today.

Now, if you cannot return, I would suggest that during one of the recesses or while the conference is going on that you make that known to Mrs. Piere. Would you stand up, Mrs. Piere?

(Mrs. Piere stands up.)

And indicate the amount of time that your statement will take, and we will do our best to put you on this afternoon.

Let me indicate what the schedule seems to be now: First, a Federal presentation, then State presentation or if there's enough citizens indicated to speak sometime this afternoon or tomorrow. We'll have more citizen groups tomorrow and then we will have an evening session tomorrow evening for those who do not make their appearance today; and if we have to, of course, it will go on as long as it takes. We are here, and we will stay here as long as there is anyone with anything pertinent to say; and in Hawaii that isn't a hardship for me. At the present time, we very well may be able to have an executive session on Thursday, and have an announcement on Thursday, but we will go on as long as it goes on. This is the schedule, and the agenda is on the wall. If you have any questions about any of it, get in touch with Mrs. Piere and she will be able to make arrangements for you.

With that, I would like to call on Mr. O'Connell for the Federal presentation.

MR. O'CONNELL: Thank you, Mr. Stein. From the Environmental Protection Agency, I would like to call on Mr. Russell Freeman, the Director of the Pacific Islands Basins Office of the Environmental Protection Agency, located here in Honolulu. Mr. Freeman.

RUSSELL FREEMAN

STATEMENT OF
RUSSELL FREEMAN
DIRECTOR, PACIFIC ISLANDS BASINS OFFICE
ENVIRONMENTAL PROTECTION AGENCY
HONOLULU, HAWAII

MR. FREEMAN: Thank you, Mr. Chairman, conferees. I will be giving this report, and you will find a number of copies of it on the table, and in addition, an addendum to the report is inside the front cover. For purposes of conserving time, I have taken the liberty of condensing this statement. However, the entire statement can be found inside of the report.

MR. STEIN: Mr. Freeman, do you want the entire report in the record, including the addendum?

MR. FREEMAN: Yes, Mr. Chairman.

MR. STEIN: Without objection, the entire report and the addendum will be included in the record as if read.

MR. FREEMAN: With that, then, I will begin the summary statement. I will have a copy of the summary statement also available for the court reporter.

Pearl Harbor is a unique body of water which is ideally suited as a harbor, a recreation area and a habitat for fish and wildlife. Located on the southern coast of the island of Oahu, it encompasses over 6 square miles of area perfectly protected from winds, tides, and other elements of nature's destructive forces. The submerged remains of the valleys of Pearl River, its system of lochs and islands provide ample space for docks and piers convenient to deep draft channels. These features, plus a strategic location, make the harbor naturally suited as the base of operations of the United States Navy vast Pacific Fleet. Thus, it is the home of the largest naval command in the world and the largest shipyard outside the continental United States.

The harbor is famous both in legend and in written history for the quality of its waters as well as the quality and variety of its fishery resources. It is these unique qualities which have earned the harbor its reputation as the "Pearl of the Pacific."

Perhaps no other place is as important as a window through which others of the world catch a glimpse of the United States. Honolulu is the crossroads of the Pacific. Travel between Pacific islands and countries normally requires stopover here. Many take advantage of this fact to spend a few days here thus adding to the volume of well over 1 million tourists who visit the island annually. Because of its significance in world affairs and in the events of history, most of these visitors take the tour of Pearl Harbor; some to see the war memorials, some to see the ancient fish ponds, some to see the shipyard with its nuclear submarine base; all to see the pollution. Even those who do not stop over are treated to a panoramic view of the harbor as they arrive and depart from nearby Honolulu International Airport. The oil slicks, the algal blooms and sediment plumes are remarkably apparent from this vantage point.

Historically, many uses of Pearl Harbor coexisted, bringing a maximum of enjoyment to countless numbers of people. In early times there were fish ponds and water recreation, and the legendary pearl oysters provided culinary delicacy for the royalty, as well as ornamental baubles for their decorative use. Shellfish, cool springs provided provisions for early voyagers to the area.

Pearl Harbor was referred to by ancient Hawaiians alternately as Puuloa, Wai Momi, Awa Lau. And please forgive my pronunciation of Hawaiian names; I haven't been here long enough to pick them up very well. The latter means "Leaf-Shaped Lagoon," a name which aptly describes the configuration of Pearl Harbor.

Wai Momi means "Pearl Water," a name derived from the abundance of pearl-bearing shellfish, both oysters and clams, which once occupied the harbor. Historians record that in the early 1800's, pearl oysters were found in great plenty, and that many persons were employed to dive for pearls. Reports of fossilized oyster beds, which can still be seen in Middle Loch, and Hawaiian legends indicate that historically the oyster beds were even more extensive than those of the early 1800's. Writings of the early 1900's recall the demise of the oyster beds through the preceding century. In 1901, Bishop recalls that in the 1830's, pearl oysters were quite abundant, and commonly found on dinner tables. "The lochs and lagoons of Pearl River were not then as shoal as now. The subsequent occupation of the uplands by cattle denuded the country of herbage and caused great quantities of earth to be washed down by storms into the lagoons, shoaling the waters for a long distance seaward." He reports back that the pearl oysters have become almost entirely extinct and drowned out by the mud. Remember, this was back in 1900.

Even though the native oyster population seemed almost extinct, several species of oysters were reintroduced into West Loch in the late 1800's and early 1900's. A survey of West Loch in 1963 identified 20 separate oyster beds which were estimated to contain over 35 million live oysters. However, oysters were found to be contaminated and unsuited for harvesting. That was a report by Sparks, in 1963.

A Federal survey in 1969 and another in 1971 confirmed that the oysters are still contaminated.

Puuloa was by legend the home of the beneficent shark goddess. Another popular legend, with many variations, referred to shoals of mullet which were said to migrate seasonally from West Loch to Laie. In the early 1800's, Wilkes found the harbor afforded an abundant supply of fine fish. The Hawaiian Historical Society describes 26 fish ponds or traps, some of which were used until fairly recent times. Of these, 14 have been filled, 6 have been destroyed, 2 are overgrown, and 4 remain in existence in one form or another. At present, there is virtually no fishing in the harbor except for limited taking of bait fish, Nehu, and some primitive fishing on the shoreline.

Legend credits the Hawaiian Chief, Keaunui, with the first widening and deepening of the harbor entrance permitting the entry of small craft to Pearl Harbor. The area was surveyed by Commander Wilkes in 1838 to 1842, and rights were acquired from the Hawaiian Kingdom for development as a U. S. Harbor in 1873. Improvements for the harbor were begun in the late 1800's and early 1900's; however, prior to World War II, the area was also used extensively for fishing, yachting, swimming, and shell collecting. Access to the harbor is controlled by present land uses and by the derelicts of past uses. We also find that pollution discharges seem or spills into the harbor from municipal and industrial sewers, irrigated fields, trash dumps, vessels, vessel-service facilities, and sunken ships.

Thus, the fish, shellfish, pearls and other resources which once attracted men to the harbor have been severely damaged or destroyed by pollution. Furthermore, aesthetic conditions are such that there is little incentive for return of those uses to which the harbor is ideally suited. Where man once fished for livelihood, divers now demand premium pay for hazardous duty because of polluted waters. Where sailing was once popular, now only the tour boats ply oily waters to reach the Arizona Memorial. Oysters, once the pride of the king's table, are now taken only by the hardy, or foolhardy, few who poach them and leave the empty shells behind.

With that sort of background,let's turn to the question of the program for pollution abatement in the harbor. First, I want to testify about the Water Quality Standards.

The Pacific Islands Basin Office of the Southwest Region of the Federal Water Pollution Control Administration was asked by the Hawaii State Health Department, in a letter dated September 26, 1968, to provide technical assistance on the pollution problems affecting Pearl Harbor. The letter stated: "We believe that the situation existing in

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Pearl Harbor is one of the more (if not the most) complex problems facing us in our collective effort to control water pollution in Hawaii."

Such assistance is authorized by section 5(b) of the Federal Water Pollution Control Act as amended. The Federal Water Pollution Control Administration initiated a study of the harbor during the first 6 months of 1969. Results of this study were compiled in a report entitled "Report on Pollution of the Navigable Waters of Pearl Harbor." Much of the information presented here is based on these early studies.

The name of the Federal Water Pollution Control Administration was changed to the Federal Water Quality Administration; and later, functions of the Federal Water Quality Administration were transferred to the Environmental Protection Agency by Reorganization Plan No. 3 of 1970, effective December 2, 1970.

In July of 1971, EPA undertook a survey of the current status of bacterial contamination of the water and oysters in Pearl Harbor. The results of this study will be discussed in a few moments by the project leaders of this study.

Water quality standards have been established for Pearl Harbor as provided for in the Federal Water Pollution

Control Act.

Following a series of public hearings, Hawaii adopted water quality standards on December 26, 1967. These standards were submitted to the Secretary of the Interior in accordance with the Federal Act and were approved by the Secretary, with certain exceptions, on March 13, 1968.

The following is a summary of the State-Federal water quality standards as they apply to Pearl Harbor.

The standards divide the waters of Pearl Harbor into three classes, according to the water uses to be protected.

Upper West Lock has been designated Class AA, thereby protecting oceanographic research, propagation of shellfish and marine life, conservation of coral reefs and wilderness areas, and aesthetic enjoyment. It is the objective of this class of waters that they remain in as nearly their natural, pristine state as possible, with an absolute minimum of pollution from any source. Accordingly, no zones of mixing are permitted in Class AA waters.

The main portion of the harbor is designated Class A. Uses thereby protected are: recreational, including fishing, swimming, bathing, and other water-contact sports; and aesthetic enjoyment. These waters are to be kept free of trash, solid materials, or oils and any waste effluent must receive the best practicable treatment or control.

Limited areas around the piers in the harbor are designated Class B. Uses protected in Class B waters include: small boat harbors, commercial use, shipping and industrial use, bait fishing, and aesthetic enjoyment. Discharge of pollutants is to be controlled to the maximum degree possible, and effluents are to receive the best practicable treatment or control.

The extent of the limited area around boat-docking facilities is not spelled out. For the 1969 Pearl Harbor study, sampling was carried out approximately 50 feet from all piers and shorelines. These stations were arbitrarily considered to be in Class A waters.

Streams entering Pearl Harbor are Class 2. Uses protected in Class 2 streams include: bathing, swimming, recreation, growth and propagation of fish and other aquatic life, and agriculture and industrial water supply. These waters are to be kept clear of trash, solid materials, or oils and are not to serve as receiving waters for any effluent that has not received the best practicable treatment.

There are basic water quality standards applicable to all waters in Hawaii. All waters shall be free of substances attributable to discharges or wastes as follows:

1. Materials that will settle to form objectionable deposits.

2. Floating debris, oil, scum, and other matter.

3. Substances producing objectionable color, odor, taste, or turbidity.

4. Materials, including radionuclides, in concentrations or combinations which are toxic or which produce undesirable physiological responses in human, fish, and other animal life and plants.

5. Substances and conditions or combinations thereof in concentrations which produce undesirable aquatic life.

All waters shall also be free from soil particles resulting from erosion on land involved in earthwork, such as the construction of public works, highways, subdivisions, recreational, commercial, or industrial developments, or the cultivation and management of agricultural lands.

The water quality standards also establish maximum permissible levels for a number of parameters. These parameters are microbiological indicators, pH, nutrients, dissolved oxygen, temperature, total dissolved solids, turbidity and radionuclides.

Hawaii's State water quality standards have been amended 3 times since 1969. Two of the amendments pertain to conditions found in Pearl Harbor. The first amendment, adopted January 21, 1971, added a "non-degradation statement." The amendment also added language stipulating that each day of continued violation would constitute a separate offense. These amendments were approved by the Administrator of EPA on June 28, 1971, and thereby made apart of the State-Federal water quality standards of Hawaii. This amendment resulted in the removal of all Federal exceptions to the State water quality standards.

A second amendment was adopted by the State with respect to Pearl Harbor waters on June 4, 1971. This amendment upgraded the requirements for those dischargers requesting a zone of mixing.

The State has also recently proposed hearings pursuant to amending the Water Quality Standards Implementation Plan for the waters of the harbor.

Pearl Harbor is a 9-square-mile estuary made up of 3 embayments or lochs. These lochs (East, Middle, and West Loch) are drowned river valleys which have been modified by wave and current action. The upper reaches of the lochs are generally quite shallow (5 to 10 feet)while the lower reaches have been dredged and at some places exceed 50 feet in depth. A quarter-mile-wide entrance channel connects the inner harbor to the sea.

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Eight streams enter Pearl Harbor, 3 of which are intermittent. These are Honouliuli Stream which enters West Loch, and Waimanu and Aiea Streams which discharge into East Loch. The others are perennial and have their headwaters in the Koolau mountain range. All of these streams drain agriculture lands and all pass through urban areas before discharging into Pearl Harbor. Halawa, Waiawa, and Waikele Streams receive discharges from sewage treatment plants.

The area of the basin drained by the streams is 89.6 square miles. The mean flow of 5 streams (Waikele, Waiawa, Waimalu, Kalauao, and Halawa) which have U. S. Geological Survey gauges at lower elevations is approximately 123 million gallons a day during the 1969 period during this study.

In addition to the tributaries, 5 large ground water springs having an estimated mean flow of 87 million gallons a day discharge into Pearl Harbor. East Loch receives 51 million gallons a day; Middle Loch, 14 million gallons a day; and West Loch, 22 million gallons a day of the spring water. A small fraction of the spring water is diverted for irrigation of watercress and sugar cane. Wastewater from artesian wells watering wetland crops such as taro and watercress is estimated by Visher and Mink in 1964 to add 5 million gallons a day to the freshwater input of the harbor.

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The 5 perennial streams were surveyed during January, February, and March 1969, with the following findings noted:

First, streams showed a close continuity in temperature and pH values which were within the normal range for January and February.

Second, coliform values were higher in all streams than the maximum level of 1000/100 ml allowed by State water quality standards; and fecal coliform levels were higher than the maximum allowable level of 200/100 ml in all streams except Halawa.

Third, there are no nutrient standards for Class 2 waters; however, levels of phosphorus in all 5 streams were found to exceed maximum permissible levels in the receiving harbor waters during the 1969 survey.

In August of 1970, a team of engineers from the Environmental Protection Agency, the State and the city, surveyed sewage treatment plants discharging to Pearl Harbor or its tributaries. Fourteen separate facilities were visited. The engineering team evaluated the performance on the basis of readily observable factors such as the state of repair, the conditions of loading as compared to design capacity, and the apparent condition of the treated effluent, (color, odor, visible suspended matter, etc.), from the outfall.

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Conclusions were drawn from this survey. One, there are too few operators to service the large number of plants in the area. As a result, plants were frequently found to be operating poorly and in a bad state of repair. Notably in this condition we found Kunia, Waipio, Mililani, Pacific Palisades, and Iroquois Point. The second conclusion was that four of the plants are overloaded. These were Pearl City, Pacific Palisades, Schofield Barracks, and the Waipio Plant. And the third finding was that in the dry season, many receiving streams carry only sewage treatment plant effluents and occasional irrigation runoff.

Since the 1969 survey, 2 treatment plants and 1 outfall have been abandoned and wastes diverted to the Pearl City Sewage Treatment Plant. Facilities abandoned are Aiea, Halawa, and Waimalu. This approach of abandoning small operations in the area overcomes many of the operation and maintenance problems noted previously but it has been one of the factors contributing to overloading of the Pearl City Plant.

Also, as an interim measure, the County has constructed a 2-cell waste stabilization pond to treat raw sewage which until quite recently entered Pearl Harbor from Waipahu. The facility, placed in operation only 2 weeks ago, also accomplishes the diversion of sewage away from Class AA waters of West Loch and into Middle Loch. The facility will be abandoned upon completion of the proposed Honouliuli regional sewerage system.

The Navy-operated Tri-Services Sewage Treatment Plant at Fort Kamehameha began operation in March of 1970. This facility provides sewage treatment for military installations located along the east side of Pearl Harbor. Plant expansion and extension of the sewage collection system are presently under way.

Bringing our attention to industrial wastes, the largest industrial waste loads entering Pearl Harbor are generated by Primo Brewery, Pearl Habor Naval Shipyard, Hawaiian Electric Company, 2 Navy powerplants, and last but not least, the Oahu Sugar Company. Wastes from the brewery and shipyard are discharged into domestic sewers before disposal into the harbor. Sugar mill wastewater is used for irrigation; however, at times irrigation tailwater reaches West Loch, and at other times mill wastes from the Waipahu Plant are discharged directly into West Loch. Thermal electric cooling waters are discharged directly into Pearl Harbor.

Separate characterization of industrial wastes was not attempted in the 1969 study because of the combining of industrial wastes with sewage.

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Let's direct our attention to the effect of this discharge on the quality of the waters of Pearl Harbor.

The 1969 survey resulted in the following findings: Coliform and fecal coliform values exceeded permissible levels in all streams surveyed; and nutrient levels in stream waters exceeded the allowable levels in downstream harbor waters.

Secondly, of the three lochs in Pearl Harbor, the area designated as Class AA had the poorest quality water of any area in the entire harbor. This low quality water was characterized by high coliform concentrations, low dissolved oxygen (DO), heavy silting, floating debris, and high nutrient values. The highest quality of water in the harbor was in East Loch and the main channel.

A severe oxygen depletion was found to occur in West Loch during the night. Early morning surface and subsurface values on March 25, 1969, were 0 mg/l at many stations in Class AA waters. During the daylight hours, values rose to over 10 mg/l in areas windward of the sewage discharge.

Turning to salinity, during the 1969 study, salinity for the entire harbor ranged from 23.6 parts per thousand to 36.4 parts per thousand. West Loch had the lowest salinity concentration in the harbor. Subsurface waters had salinities which were generally 3 parts per thousand higher than surface waters. The top of the halocline ranged from 18 inches to 6 feet below the surface in West Loch. Stratification was less pronounced in other lochs because of the lower influx of freshwater.

In West Loch Class AA waters, phosphorus concentrations ranged from 0.028 mg/l at Waikele to 0.650 mg/l adjacent to the raw sewage outfall. The average value for the Class AA area was 0.098 mg/l, five times the existing water quality standards. The remainder of the stations which are in Class A waters, had values ranging from 0.026 mg/l to 0.086 mg/l and averaged 0.051 mg/l, which also exceeds allowable standards by a factor of 2.

Nitrogen data from the 1969 Survey of Pearl Harbor are not conclusive; however, the results are noted for future reference. They show the average total nitrogen values in West Loch, Class AA waters, to be 0.44 mg/l and values in East Loch and channel stations to be 0.18 mg/l. No data was taken from Middle Loch. These values also exceed established water quality standards.

Median total coliform counts for Class AA waters ranged from 100/100 ml in the area south and west of Laulaunui Island to 670,000/100 ml in the vicinity of the Waipahu raw sewage discharge; therefore, none of the AA stations sampled during this survey met the water quality standards for total coliforms. Standards were also exceeded in other areas near

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the terminus of sewage discharges.

Results of limited sampling also indicated that fecal coliform standards are exceeded in areas located adjacent to the major sewage outfalls and in isolated spots around Navy piers.

Elements of the U. S. Public Health Service which are now a part of the Environmental Protection Agency's Office of Research and Monitoring, conducted detailed radiological studies of Pearl Harbor in 1966 and again in 1968.

These surveys were designed to locate, identify, and quantify any radionuclides present in the harbor and its environs and to evaluate the public health and environmental implications of man-made radioactivity in Pearl Harbor.

Both surveys consisted of field and laboratory phases. Samples of harbor water, bottom sediment, shore sand, tap water, well water, stream water, watercress, fish, oysters and other biological data from Pearl Harbor and the Pearl City area for quantitative and qualitative laboratory analyses.

The overall conclusion drawn from these studies was that no public health or environmental radiation hazard existed in Pearl Harbor or surrounding areas.

A recent report made in April 1971, by the U. S. Navy entitled "Pearl Habor Pollution Model Study, Progress

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Reports from the Oahu Comprehensive Study" and EPA visits during August 1971, provide the most recent information on conditions in Pearl Harbor. The EPA report will be discussed by the Survey team leader later.

The Progress Reports of the Water Quality Program contain much useful 1970 data on the water and sediments of Pearl Harbor. In West Loch, the sample sediments were in the range of 50-60 percent clay, 30 percent silt and 10 percent sand. By contrast, in the main channel between West Loch and Middle Loch, the percentages were about 23 percent clay, 21 percent silt and 46 percent sand. Sulfide levels often provide an indication of organic content and of a lack of adequate oxygen. In the West Loch sediments, sulfides were quite high compared to other areas in the harbor. The West Loch sediment samples average about 1.5 mg/gm sulfides whereas a nearby main channel sample had only 0.05 mg/gm. The difference is a factor of 30.

The Navy study reports that a large quantity of sediment is entering tributary streams from construction sites. In one case, fill had been bulldozed directly into a watercourse.

In the course of sampling the waters and oyster beds in Pearl Harbor in early August of this year, EPA field crews noted that muddy, discolored waters were present in shallow portions of all 3 lochs. During this survey, the sampling boat ran aground in 2 areas of West Loch while trying to visit sites which were sampled from the same boat routinely in 1969. These sites were located near the Waipahu Dump.

Thus, it is apparent that although some pollution abatement progress has been made since 1969, the environment is still damaged as a result of erosion and of poor land development and management practices in the watersheds. These conditions constitute a violation of section 6(A)5 of the State-Federal water quality standards where they can be found from activities of man in the watersheds.

Thermal wastes are discharged to Pearl Harbor from several sources. The principal source is the Hawaiian Electric Plant at Waiau. Other sources include 2 small Navy powerplants which are being phased out of operation, vessel engine cooling discharges and miscellaneous small sources. No study of the effects of thermal wastes on Pearl Harbor has been made by EPA. The discharge temperature at Hawaiian Electric reportedly exceeds the temperature of harbor waters by approximately 10°F., whereas the maximum increase allowable under water quality standards is 1.5°F.

There are pollution problems in Pearl Harbor other than those described above. Wastes from vessels and storm sewers enter the harbor. Oil and fuel spill into the harbor from storage and transmission facilities. Heavy metals and other contaminants are reportedly found in the sediments. High biochemical oxygen demand and nutrient values have been reported in the waters, particularly those of West Loch. Data from the Oahu Comprehensive Study show that oxygen levels near the bottom of West and Middle Lochs are well below saturation at the same time levels in surface waters are at or near saturation. They also report that secchi disc visibility generally ranges between 3 and 10 feet. Floating oil slicks are frequently observed in East Loch, Middle Loch and the entrance channel. Several fish kills have been reported in Peal Harbor. One, in Halawa Stream in 1965, was blamed on pesticides. More recent fish kills were reported as follows: One, Waimalu Stream, June 25, 1971, approximately 200 fish and some oysters were reportedly killed by construction dewatering activities. Two, West Loch, Pearl Harbor, May 13, 1970, a small number of fish killed, cause undetermined.

The conditions just described undoubtedly affect oyster populations in Pearl Harbor. Under natural conditions, West Loch, Pearl Harbor is an extremely favorable environment for oysters. Water temperatures, salinity, satisfactory food materials, adequate substrate for attachment, and a lack of predators allowed extensive beds to contain predominantly the Eastern oysters, Crassostrea virginica. In 1962, Sparks estimated that 55,630 bushels of live oysters were present in 150,000 square yards of major beds. He also found that the waters and oyster meats contained high levels of total and fecal coliforms which rendered them unfit for direct human consumption.

The findings of EPA confirm similar findings by Sparks and the U. S. Navy in 1966 (unpublished data) which indicated the presence of a health hazard to persons eating West Loch oysters taken directly from the area without a period of depuration. The relationships between pollution, oysters and the health of man will be discussed more fully later on with one of our experts this morning. The EPA studies also indicate that pollution affects both the oysters and the physical condition of oyster beds.

Deposits of silt and other settleable sludge are filling in the area of West Loch waters zoned Class AA. Depth of silting is over 8 feet in the undredged area between Laulaunui Island, the recently abandoned sewer outfall on the Waikele side of the island.

Sediments are a blackish, brown-colored organic sludge having a strong rotten-egg odor of hydrogen sulfide. As distance from the outfall increases, the odor of the sludge changes to a musty, swampy smell.

No microbenthic organisms were found in the so sediments, indicating extreme biological degradation in the area.

In most of the northern beds of West Loch, it is common to find elongated, compressed oysters attached to the shells of predecessors, growing out of the mud among invading mangroves. In several areas of West Loch, the inner valve surfaces of oysters typically contain small nodules of mud which have been encysted on the wall. These undoubtedly result from the oyster's inability to purge excess mud from the shell cavity.

Little is known about the food habits of oysters in Pearl Harbor. In general, oysters obtain their nourishment by filtering organisms from the water. Studies by Sakuda published in 1966 indicated a progressive deterioration in the condition of West Loch oysters from south to north. He attributed this to excessive silt in the water which interferes with filtering and feeding. A second factor that could be typically responsible for the type of oyster available would be the change in the type of organism that would be consumed. In the northeastern United States, organic wastes are known to have changed the composition of phytoplankton, with the result that oyster populations rapidly disappeared. Thus, it would appear that oysters in West Loch may be threatened by pollution, and by secondary effects of pollution on other facets of the aquatic environment.

We turn our attention now to the programs for pollution abatement in Pearl Harbor, the programs of the city and county of Honolulu. In mid-1970, the city and county of Honolulu employed a consortium of consulting firms to prepare a comprehensive water quality control plan for the Island of Oahu. This consortium has proposed 9 separate sewerage districts for the Island of Oahu. Each district will eventually have its own sewerage system. Four of these are important to the Pearl Harbor area. These 4 include the systems which serve Honolulu (Sand Island), Kaneohe and Kailua, the immediate environs inPearl Harbor, (Honouliuli) and Central Oahu.

The Sand Island and Kaneohe-Kailua systems have been given first priority by both the city and the State. Establishing such priorities gives these systems first call on the financial resources of city, State, and Federal governments. It is because of this fact that the systems are important to the Pearl Harbor area.

Based on recent testimony presented to the Governor's Task Force by the city and county, the most recent plan for the Honouliuli system proposes sewers to collect wastes from the communities fringing Pearl Harbor on the north and west. It also incorporates a secondary sewage treatment plant with initial disposal of treated wastes by irrigation and eventual disposal via an ocean outfall near Barbers Point. The present schedule calls for completion of collection systems along the northern edge of Pearl Harbor, the treatment plant, and the irrigation delivery systems by 1975. The ocean outfall has been deferred to 1990.

Turning to the Central Oahu area, it lies in a saddle between the Waianae and Koolau mountain ranges. A part of the area drains into Kaiaka Bay on the north shore of the island, and a part drains into Pearl Harbor. The area is presently served by 8 sewerage systems. The comprehensive plan calls for consolidation of a number of these systems; however, 5 would remain. At the present, treated wastes are discharged into streams and reservoirs in the area. A portion of the sewage flowing toward Pearl Harbor is diverted for irrigation, and a portion flows to West Loch. The stream discharge containing treated sewage is required to meet the Class AA water quality standards by the time flows reach West Loch. At present, no firm date has been established for implementation of the Central Oahu portion of the Master Plan.

Looking at the abatement program for the State of Hawaii, the water pollution program for the State of Hawaii is administered through the State Health Department, Environmental Health Division. The program has concentrated on the establishment and implementation of water quality standards. The implementation process involves use of permits to establish requirements which must be met by each discharger within the time frame set forth in the Water Quality Standards Implementation Plan.

The Governor has also taken actions affecting pollution control programs in Pearl Harbor. At his invitation, the President's Water Pollution Control Advisory Board met in Honolulu during the week of June 6, 1971. The Board viewed Pearl Harbor pollution problems by helicopter and received general testimony on pollution problems and pollution abatement efforts in the state. Some of the board's findings and recommendations pertained to Pearl Harbor. To the State, the board recommended the following: first, the strengthening of the State water pollution control program; second, placing of higher priority on sewerage projects; third, use of user charges or other cost recovery methods to speed up sewerage construction; fourth, more intensive water quality monitoring; and fifth, more effective control of soil erosion, particularly agricultural runoff.

To the Environmental Protection Agency, the board recommended the following: first, pursuit of a vigorous and active role to insure that sedimentation, pollution or other deterioration of the Nation's waters, including those of Hawaii and Pearl Harbor, be prevented; second, they recommended action to insure implementation of State-Federal water quality standards; and third, they recommended greater control over program grants to State pollution control agencies. The board also found that programs of Federal Agencies reach into all facets of the environment, and these programs lend themselves to management and control of environmental pollution problems in accordance with the mandate of the National Environment Policy Act. The board also commended the Navy for its action program in Pearl Harbor, but specifically recommended that "the Navy seek appropriations for dockside receiving facilities for sewage from ships tied up in Pearl Harbor."

Governor Burns has also appointed a Task Force to recommend ways of abating the pollution of Pearl Harbor. The Task Force has also identified several water pollution problem areas for which abatement actions appear to be warranted. Task Force committees are presently working to define these problems more clearly and formulate action programs for solving them. The problem areas so far identified are as follows: municipal sewage, industrial wastes, oil spills and other discharges of oil, agricultural wastes, sediment, thermal wastes, vessel wastes, storm sewer runoff, discharges from springs, discharge of heavy metals, and radioactivity.

Federal Executive Order 11507 was promulgated by President Nixon on February 4, 1970. This Order requires that all Federal Agencies bring pollution sources into conformance with State and Federal water quality standards Actions to achieve compliance with the Executive Order must under way or completed prior to the end of 1972. In response to this mandate, the Army, Navy, and the Air Force programmed control measures for known sources of pollution. All major known sources of domestic wastes have been placed on abatement schedules which will result in compliance with the Federal Executive Order. There are 2 exceptions of cases where coordination with local civilian sewerage systems is involved. In these cases, abatement schedules necessarily coincide with those of the civilian community. The latter include Army: Tripler, Fort Shafter and Schofield Barracks; and Navy: Iroquois Point and Barbers Point Facilities.

The military also has under construction industrial waste treatment and oil-water separation facilities at Hickam Air Force Base and at the Naval Shipyard.

In April of 1971, the Navy initiated a study of Pearl Harbor to locate sources of water, air, noise, solid wastes and aesthetic pollution. The effort was aimed at identifying any problem areas which might have been previously overlooked and at initiating an active program to solve those problems. This study identified 47 sources of water pollution 23 of which were found to be outside of direct Navy control.

In addition to programming needed controls for those problems under its own jurisdiction, steps were taken to stimulate action on the part of other Federal, State, and local Agencies. Results of the study were presented to a meeting of select members of the Federal Executive Board, to the President's Water Pollution Control Advisory Board, and to State officials and prominent industrial leaders. It was mainly this effort which eventually led to appointment by Governor Burns of the Pearl Harbor Task Force.

There are other recent pollution abatement actions which should be noted here. Refuse is no longer dumped off the face of the Waipahu dump into the waters of West Loch. However, trash and refuse are still placed in the dump and periodically covered with earth. Poor compaction and improper construction of the fill area permit water to come into contact with organic material in the fill. During low tide, black odorous water can be seen flowing into West Loch at the toe of the dump.

The Oahu Sugar Company has constructed a series of small ponds to trap tailwater from its field on Waipahu Peninsula. The company expects that once sewage flows are removed from the irrigation system, these small ponds will detain all runoff from adjacent fields. Water from the ponds is expected to dissipate by seepage and evaporation.

There are a number of deficiencies in the pollution abatement plans just discussed. I think first I'll discuss the Honouliuli System.

The Honouliuli System will collect many of the municipal and industrial sources of waste presently discharging into Pearl Harbor on the north and west. There are several obstacles to be overcome before construction of this facility can proceed. First, selection of system elements must be resolved. The interim plan for Mamala Bay, prepared in early 1971, which is the plan which was submitted to the Federal Government in support of the project, describes the system as "a primary treatment facility with effluent disposal via an ocean outfall sewer located east of Barbers Point." However, in reporting the city's plans to the Governor's Task Force in July 1971, the system was described as "a secondary treatment faciltiy with reclamation of treated effluent for irrigation of cane in the Ewa area." The latter report states that an ocean outfall sewer will ultimately be constructed for disposal of excess effluent.

Prior to construction of an ocean outfall, water quality standards require: first, a finding with regard to the nondegradation statement; second, an appropriate State permit. To obtain either, the city and county must be able to demonstrate that the system proposed conforms to the "best practicable treatment or control" requirements of the water quality standards. Furthermore, State and local government agencies expect that Federal Government will bear a proportionate amount of the cost of these systems. However, a Federal Regulation promulgated in July of 1971 requires that plants receiving Federal financial assistance meet certain performance specifications as follows: first, substantially complete removal of all floatable and settleable materials; second, removal of not less than 85 percent of the 5 day biochemical oxygen demand; third; substantially complete removal of pathogenic microorganisms; fourth, such additional treatment as may be necessary to meet applicable water quality standards or recommendations of the Administrator of EPA or court order pursuant to Section 10 of the Federal Act. Primary treatment would not meet specification Number 2. There is provision for waiver of this requirement; however, no such waiver has been granted by the Environmental Protection Agency.

Turning attention to the problem of scheduling, the city plan for Honouliuli calls for site acquisition studies to begin in January 1972. Pre-project planning would begin in January 1974; plant design in September 1974; and initial construction in January 1975. The plant would not be completed until January 1977. After reviewing this schedule, the Governor's Task Force passed a resolution [illegible] plant and appurtenances by 24 months. It will be noted that the President's Advisory Board was also critical of the city and county's general construction schedule.

A problem created by the city and county schedule is deferring of sewer lines which would service military facilities. By Executive Order, the military is required to have pollution abatement works under way by the end of 1972. The preferred method of handling domestic wastes is conveyance to regional sewerage systems. Thus, the Navy plans to connect Iroquois Point and Barbers Point housing areas to the Honouliuli system. However, sewers which would serve the Navy are not in the first increment of construction at Honouliuli. The Ewa-Honouliuli interceptor has been deferred to the second phase scheduled for completion sometime between 1975 and 1980. This means that the Navy must build its own treatment and disposal system, or convince the city and county to accelerate its planned interceptor. The Navy, through the Governor's Task Force, has encouraged acceleration of the interceptor.

Turning to the Central Oahu System, problems also stand in the way of completing the Central Oahu sewerage system. Major sewage treatment plants in this area at the present time include Wahiawa, Mililani, and Schofield. There are 5 other small plants in the area. Of the 3 major plants, only Mililani and Schofield discharge to streams tributary to Pearl Harbor. All of the facilities in the area provide secondary treatment. However, Oahu comprehensive plan recommends that the small Navy plant at Kunia and the stabilization ponds at Wheeler Air Force Base be phased out, and sewage be conveyed to the Army's Schofield plant. It also recommends abandoning the small plant at Waipio Acres and conveying sewage to the Mililani Development. These recommendations if followed would reduce the number of plants in the area from 8 to 5.

The major unresolved problem is what to do with the treated effluent. The State has determined that treated wastes discharging to tributaries of West Loch, Pearl Harbor must meet the Class AA standards of the harbor waters at the stream mouth. Since there are periods in which the entire stream flow consists of treated sewage, this places stringent requirements upon the stream discharge. Alternatives include cursory treatment, use of wastes for irrigation, or conveyance to other drainage areas not tributary to Class AA ocean waters. The Board of Water Supply is opposed to use of large quantities of treated sewage for irrigation, unless it can be demonstrated that the quality of the island's groundwater supplies would not be impaired. The Oahu Comprehensive Plan concludes that it would not be feasible to provide an ocean outfall for wastes from this area. However, members of the Governor's Task Force have suggested the practicality of abandoning secondary plants in the area, and providing a major trunk sewer to tie into the Honouliuli system.

This situation presently remains unresolved, but the Army now has funds available for replacement of the obsolete secondary plant at Schofield Barracks. It has been tentatively suggested by involved State and Federal Agencies, that construction of this plant proceed, based upon the assumption that objections to local use of wastes for irrigation can be resolved. However, prospects for timely resolution of this issue are not promising. Unless a course of action is adopted and a schedule established, prolonged study and delay can be expected, and the Army's investment may finally be negated. Thus, a timely decision would appear to be warranted.

There are other problems that we need to discuss. First of all, there are presently no firm plans for timely control of pollution from the Waipahu Dump area.

Problems of sedimentation have been attacked on a piecemeal basis. Under pressure from Federal funding Agencies, State construction contracts now require control of sediment from highway construction activities. New grading ordinances have been proposed at the county level to control erosion from grading related to housing and commercial construction. Agricultural control is encouraged on a voluntary basis through the State and Federal agricultural programs. These activities need to be consolidated into comprehensive effort, and extended to include control of erosion from undeveloped lands and stream channels.

At this point, I would like to break off the general discussion which has preceded, and turn control of the program over to Kathleen Shimmin, who is a microbiologist representing the Environmental Protection Agency. She was in charge of the recent 1971 Federal study that was carried out in Pearl Harbor.

MR. O'CONNELL: Mr. Freeman, before you do that -- before you step down, there is one thing I would like to do. I would like to introduce one of our guests who might have to be leaving shortly, and that is Admiral Hayward, the Commandant of the Fourteenth Naval District of Hawaii and the sea frontier.

One question with regard to the Waipio pond, it's my understanding that these were built without Federal funds, and therefore are not subject to Federal design.

MR. FREEMAN: That is correct.

MR. O'CONNELL: That being the case, I don't know whether there has been any comment on the design features or whether or not you think those would meet Federal design requirements.

MR. FREEMAN: I'm sorry, I can't answer that. First of all, I didn't personally review the plan; and then secondly, we have not reviewed it because I think it would be inappropriate to comment on that at this time.

MR. O'CONNELL: Probably we can pick that up with the city and county.

The other point of confusion seems to be the license of the pond which is directly related to the Honouliuli system. I think there's some confusion about when that will be built.

MR. FREEMAN: Again, I think it would be best to take that up with the city and county.

MRS. MINK: May I clarify that point? When the special land permit was requested in order to construct these ponds, the Environment Protection Agency was asked to comment, and their letter of comment is included in the record. So I would like to say that I think, through that, that the EPA is very much involved in the granting of the permits which permitted the construction of these ponds.

MR. STEIN: I think, again, these are things that we have to resolve regarding the ponds. It seems to be a very definite question whether the ponds are going to have adequate design to do the job or whether they were minimally designed. Now, if they were minimally designed, and our population is growing, we're going to have tremendous problems and a longer wait for the permanent system to come in. And again, I think that we may have the climatic condition to operate a pond, unlike for example, places like North Dakota where you have extreme variations in temperature.

I don't know, and maybe the scientists can tell me, or maybe the engineers, but I know that when the pond is not properly designed, the best kind of control often does not lead to satisfactory results. I think we're going to have to resolve this definitely, 1) if the pond is adequately designed. If it is not, what we can do to assure adequate design and possible changes or alterations of the project to assure that.

2) Given the situation that we have, we do have within the Federal establishment people who are specialists in operating ponds to their optimum efficiency the question is whether, again, we would need to have these in the status of the interim situation, or whether it would be worthwhile to have experts made available to you to assure that this was going to work.

3) Safety. It has been made apparent again and again that anyone who sets up one of these oxidation ponds in a relatively highly populated area such as the metropolitan area of Honolulu -- and you didn't put it up in the prairie -- is going to have to have safety considerations. It surely

can't be attractive to tourists, or if the kids walk across and fall in. And evidently, these ponds were built in populated areas, and we're going to have to take this up too. And I think we're not going to lose this, but I would like to ask if the Federal people can shed any light on this any further, or if you want to hear from the safety people.

DR. QUISENBERRY: I think it would be preferable to talk to the city and county.

Mr. Chairman, I might add that I will ask Mr. Shenji Soneda who is chief of our Environmental Health Division who will be making a presentation for the State, to comment on the ponds, and the question brought up by Representative Patsy Mink. Will this be satisfactory?

MR. STEIN: Yes. I want to make it very clear that this will be one of the things that the conferees will work at, and come up, I hope, with a conclusion and recommendation.

I think that Congresswoman Mink has certainly made a point that certainly needs consideration before we leave this conference.

We have two people who have very short statements. Mr. Freeman, will you be through very shortly?

MR. FREEMAN: Yes, Mr. Chairman, I will be through very shortly.

MR. STEIN: Miss Kathleen Shimmir.

STATEMENT OF

KATHLEEN SHIMMIN, BIOLOGIST

ENVIRONMENTAL PROTECTION AGENCY

SAN FRANCISCO, CALIFORNIA

MISS SHIMMIN: I am going to present findings that were taken from Pearl Harbor in July and August of 1971.

The study was undertaken in order to gain current data which would show whether or not the total and fecal coliform levels were within the limits prescribed by water quality standards for the State of Hawaii. Oyster and water samples were collected from selected sites primarily in West and Middle Lochs. Four stations from East Loch were also assayed. Laboratory work was performed in Alameda, California EPA laboratory for 3 out of the 4 checks on oyster samples, and in Pearl Harbor Navy Public Works laboratory for all the water samples and one set of oyster samples. The period of sampling extended from July 12 through August 10, 1971. That was 30 days.

Methodology that was followed was that water samples were assayed by the membrane-filter technique. Oysters were tested by the most probable number method. Except as otherwise stated, all testing was in accordance with *Standard Methods for the Examination of Water and Wastewater* from the 13th edition, 1971, and with *Recommended Procedures for the Examination of Sea Water and*

Shellfish, 4th edition, 1970.

A chain of custody was established for each sample. The maximum time elapsing between water-sample collection and processing was as follows: Class AA waters -- 1½ hours for fecal coliforms and 3 hours for total coliforms; Class A waters -- 2 hours, fecal coliforms and 3½ hours, total coliforms.

The Pearl Harbor Study conducted in 1969 by EPA showed that maximum bacterial counts were obtained during an ebb tide. Accordingly, water samples were collected as the tide ebbed. Oyster samples were gathered at low tide.

Replication was employed in order to check the precision of the testing procedures. Membrance filters for each station were run with 6 dilutions, each in duplicate. Tube testing was by the 5-tube method (5 replicates for each 10-fold dilution).

Sampling sites are indicated on the chart to my left and were selected from the array assayed in the 1969 study. Fixed landmarks on land and in water served as triangulation points for the determination of sample site location.

There are 4 oyster stations within Class AA waters and 3 stations in Class A waters. The water stations include West Loch -- 13 in Class AA, 2 in Class A; Middle Loch --

13 stations in Class A; and East Loch -- 4 stations in Class A.

The results of the sampling at this time: The water quality standards for Class AA waters state that the median coliform bacteria shall not exceed 70/100 ml nor shall samples exceed 230/100 ml at any time. The following table that is projected on the board summarizes for Class AA waters median total coliform levels, ranges, and excesses. This is for Class AA waters in West Loch. Stations WN10 and 20 and 30 were sampled four times. The medians were as follows: 740, 560, and 5,100. The number of times the single value exceeded 230/100 ml: two times for WN10, two times for WN20 and three times for WN30. Stations WH10 amd WH20 were sampled four times, and the coliform medians were 23,000 and 25,000; and for each the single value exceeded four times. WE10, WE20, and WE30 were sampled four times with median total coliform values of 580, 1,700, and 1,100; and the number of times that they exceeded were two times out of four for WE10, and four times out of four for WE20, and three times out of four for WE30. Station WF10, sampled four times, the coliform median was 990, and the single value was three times out of four, and four times out of four for WF20. WM10 was sampled four times, and the total coliform was 85, and the single number exceeded zero. WM20 was sampled four times, [illegible] coliform median was [illegible], [illegible]

WM30 was sampled three times, and the total coliform was 2,400, and the number of times it exceeded was two.

The median limit of 70/100 ml is exceeded at each station. The limit for single values, 230/100 ml is exceeded a varying number of times.

According to standards in Class A waters, the median coliform bacteria are not to exceed 1000/100 ml, nor shall more than 10 percent of the samples exceed 2,400 per 100 ml. The fecal coliform content is not to exceed an arithmetic average of 200/100 ml during any 30-day period nor shall more than 10 percent of the samples exceed 400/100 ml in the same time period. By some or all of these criteria Stations WB10, WB20, SM01, MF20, and MA30 are in violation. Results are tabulated.

Samples were collected on 4 different days during July and August 1971, and the results are summarized in a table and graph.

Salmonella derby was isolated from oysters collected at Loch Point on August 10, 1971. _Salmonella_ organisms are pathogenic for humans. Serotyping of the culture was done by California State Department of Public Health.

National Shellfish Sanitation Program sets a maximum allowable level of 230 fecal coliforms per 100 gram shellfish meat. This limit is exceeded at Stations 1, 2, 3, 5, and 7A in every sample.

To summarize, first, Class AA waters in West Loch are polluted. The bacterial limit set by water quality standards that median total coliform bacteria shall not excees 70/100 ml is exceeded at each of the 13 sampling stations.

Secondly, during the period of the study, 30 days in July and August 1971, oysters from Stations 1 at Walkers Bay, 2 at Loch Point, 3 at Laulaunui, 5 at One Rock, and 7A below Pearl City outfall were unacceptable 100 percent of the time. An organism known to be pathogenic for humans was isolated from the Loch Point bed. Oysters from Station 4 at Salt Bed were within the acceptable limits set by the National Shellfish Sanitation Program. Oysters from Station 6 at Middle Loch were unacceptable on one day, July 12, 1971, and acceptable on the remaining 3 sampling times.

And third, Class A waters in West and Middle Lochs show violation of water quality standards at Stations WB10, WB20, SM01, MF20, and MA30. Other stations sampled in East and Middle Lochs were in compliance during the period of study.

MR. O'CONNELL: Thank you very much, Miss Shimmin. The next portion of the EPA presentation on this matter will be presented by Mr. C. B. Kelly who is the Special Research Assistant in the Division of Water Hygiene, in the EPA

C. B. KELLY

Headquarters at Washington, D. C.

STATEMENT OF

C. B. KELLY

SPECIAL RESEARCH ASSISTANT

DIVISION OF WATER HYGIENE

ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D. C.

MR. KELLY: Mr. Chairman, ladies and gentlemen. The title of my presentation is "The Health Hazards Associated with the Consumption of Shellfish from Polluted Waters."

That consumption of shellfish (oysters, clams, and mussels) harvested from polluted estuaries has been responsible for enteric diseases in man is a well established fact, documented many times over by epidemiological investigations and corroborated by microbiological and biological studies. To understand how these shellfish become vectors of enteric diseases, one must consider the following:

1. In collecting food, the shellfish take in and ingest bacteria, viruses and certain inorganic and organic compounds adverse to man's health.

2. Shellfish accumulate and concentrate bacteria and virus to levels in their bodies much higher than in the surrounding water. They also collect and assimilate metallic and organic compounds and, as in the case of bacteria

and viruses, higher levels are attained in the shellfish than in the surrounding water. The microorganisms are seldom if ever found in the tissues of shellfish, but many inorganic and organic substances are stored in specific organs and tissues. Thus, these substances become deep-seated in the tissues and are released more slowly.

3. The entire animal, exclusive of theshell, is consumed by man. The food collecting organs and the gastro-intestinal system become part of the portions eaten by man.

4. The shellfish are often eaten raw, or only partially cooked.

Ingestion, the first stage of the feeding process proceeds as follows:

An intricate coordinated ciliary action creates a current of water which is drawn in from the outside and driven through the gill slits. Here food material, suspended or dissolved in the water, is removed, partly by mechanical action, but also by entrapment and adsorption on mucous that is generated by specialized cells in the gills. The mucous forms a sheet which, again by ciliary action, is transported over the gills to the labial palps, the mouth of the oyster. Through this combination of mechanical and physio-chemical mechanisms, the oysters can remove very small particles as small as bacteria and viruses, and by adsorption certain inorganic and organic compounds and substances.

Many external factors influence the rate at which oysters pump water through their gills. Probably the most fundamental of these factors is water temperature, but pumping (the water transport process) and feeding (the food collecting process) are also affected by salinity, chemical agents, silt, and excessively high concentrations of plankton, to name a few.

The uptake of bacteria by shellfish has been the subject of controlled *in vivo* studies, carried out primarily to gather knowledge on the influence of environment factors such as temperature on the water/shellfish bacterial relationships, and to compare the rate of uptake of several species of shellfish. These studies confirmed that bacteria were taken in during the feeding process, and that the uptake of bacteria was related to the rate of feeding. The environmental factors, such as temperature that influenced feeding, likewise controlled uptake of bacteria. When actively feeding it was found that the numbers of bacteria in the shellfish were manyfold those in the water.

That virus also are accumulated by oysters was demonstrated in a 4-year study conducted in an almost completely enclosed estuary in New Hampshire that receives raw and treated domestic sewage. Viruses were isolated from

114 of 459 oyster samples and from 103 of 310 water samples. Types of viruses that have caused disease in man were identified.

Quantitative estimations of the rate of virus uptake by oysters have been made in controlled experiments. These studies featured simultaneous observations on the uptake of the bacterial indicator, E. coli. When exposed to water contaminated with virus and bacteria, the viral content of the oyster meats reached 10 to 60 times that of the surrounding water. Accumulation of E. coli closely paralleled that of the virus.

The finding of virus in shellfish in polluted estuaries, demonstration of the presence in feces, and experimentation which quantitated the rate and extent of accumulation of virus, as well as a behavior parallel to that of E. coli furnish scientific proof of the potential that shellfish can be indeed vectors of enteric viral diseases.

It is well know that ingestion of excessive amounts of certain heavy metals produce chronic effects on man. Lead poisoning is probably the best known, but other metals, such as arsenic and mercury, when taken in small doses over a period of time will have adverse effects. In larger doses, acute toxicities result. Certain organic compounds such as pesticides and petrochemicals can be acutely or chronically toxic.

Shellfish can selectively concentrate metallic salts and organic compounds to levels many hundred of times that in the surrounding water. The capability of bivalve mollusks to accumulate metal ions has been studied and the extent of accumulation, called "enrichment factors" has been determined. Examples of these for the oyster are:

Cadmium	226,000
Chromium	31,600
Copper	14,800
Nickel	3,300
Lead	4,100
Zinc	148,000

Exposure to these toxic agents may also have adverse effects on the shellfish. These effects will range from inhibiton of essential functions to mortality. Generally speaking, the larvae are more sensitive to toxic materials than the adult, but it has been shown that exposure of oysters to 0.2 ppm ofcadmium for 10 weeks resulted in a 51 percent mortality, and exposure of clams to 0.05 ppm of copper for 20 weeks resulted in a 93 percent mortality.

It has been known for centuries that shellfish collect and store naturally occurring marine biotoxins that can be lethal to man. The most extensively studied of these toxins is the so-called saxitoxin, which is the cause of paralytic shellfish poisoning. This toxin is generated by dinoflagellates of the species Gonyaulax. It is found in the Northeastern United States and Eastern Canada estuaries, and on the Pacific Coast from California to Southern Alaska. Because of the confinement to these areas and also because the blooms of this organism has not been associated with pollution, this toxicity is mentioned only as a well known example.

Another biotoxin, this one generated by a dinoflagellate *Gymnodimium breve* has been associated with pollutio or at least enrichment of the sea. This organism periodically attains high population densities along the Florida West Coast, and the coasts of Texas and Mexico. Numerous mass fish mortalities have been associated with these "red tides." In 1962 the uptake of the toxin by oysters and clams was demonstrated by illnesses among persons who had eaten these shellfish species harvested from Sarasota Bay, Florida.

Several persons became ill after eating oysters and clams harvested from Sarasota Bay, Florida while a red tide outbreak was occurring. The symptoms in man were not similar to those produced by the paralytic shellfish poison.

were similar in many respects to those produced by the ciguatera fish poison found in certain fishes of the Pacific and the Caribbean.

Another observation made is relevant to the recreational use of marine areas. Irritation of the upper respiratory tract was experienced by field staff during the course of surveys and sampling tours. The symptoms were spasmodic coughing, sneezing, and respiratory distress. On some occasions, irritation of the eye was experienced. The cause of these irritations was the inhalation of toxic products in the red tide blooms that had become aerosolized by rough surf action resulting from brisk winds. These observations were similar to those of other workers in red tide areas. It is probably the cause of a similar series of incidents on the coast of New Jersey in 1968.

Knowledge that shellfish can be vectors of bacterial enteric diseases dates back for centuries. Investigators have developed a partial list of more than 100 shellfish-borne outbreaks of typhoid fever or gastroenteritis that occurred from 1815 to 1936. More recently, this list was supplemented by a recording of shellfish-borne outbreaks of typhoid fever, salmonellosis, and gastroenteritis during the period of 1940 to 1968. The list includes 24 outbreaks of enteric disease scattered throughout the United States. Shellfish associated typhoid fever occurred as recently as

1968. There were 2,263 declared cases of typhoid and paratyphoid fever in France in 1960. Epidemiological reports received from 490 of these revealed that shellfish was responsible for 83 cases. An outbreak of gastroenteritis involving more than 100 cases occurred in Tokyo, Japan in 1966, attributed to the consumption of oysters harvested from areas of questionable quality and/or contaminated in processing.

An isolated case of enteric disease should not be considered lightly. The classic series of events described in 1940 shows the potential for mass spreading (85 cases) of typhoid fever. The person, an oyster fisherman, contracted typhoid fever 8 years previous to the reported shellfish-borne outbreak. He became a carrier as a result of this illness. It is hypothesized that he contaminated his daily catch of oysters while they were in wet storage in an area that was exposed to overboard discharges from the boat on which he stayed overnight. He "peddled" these oysters in the hamlets in Louisiana where the illnesses occurred.

The association of shellfish with outbreaks of infectious hepatitis is quite recent. Oysters were identified as the vector of hepatitis in Sweden. A total of 119 cases were attributed to the consumption ofoysters supplied by fish dealers in one community. The incident is reminiscent of the outbreak of typhoid fever in 1924 and 1925. In both incidents the oysters had been subjected to wet storage in confined basins that received discharges of human excrets. Another report states that some 529 shellfish-associated cases of hepatitis occurred in Sweden in 1956.

The first recorded outbreak of hepatitis in the U. S. from the consumption of raw oysters attributes the contamination of the shellfish to the discharge of raw domestic sewage from a community sewerage system and from a commercial shipyard. During the first 3 months of January 1961 (while these discharges were occurring), 84 cases of oyster-related hepatitis occurred in Pascagoula, Mississippi, and Mobile and Troy, Alabama, where the incriminated oysters had been sold to seafood markets and one restaurant. The oysters were harvested from heavily contaminated waters in Pascagoula Bay, tributary to the river in which the discharges occurred.

The consumption of raw clams from polluted waters was the cause of infectious hepatitis in Greenwich, Connecticut, in late 1960 and early 1961. The source of pollution is attributed to be the partially treated sewage treatment plant effluent serving a population of 9,700. This discharge could reach the clam beds in less than 2 hours. Excessively high coliform and fecal coliform densities were found throughout the receiving estuary.

Other incidents of shellfish-associated hepatitis have been reported which, during the period of 1961 through 1966, included a total of 878 cases of hepatitis that were associated with the consumption of shellfish.

Probably the most investigated incidents of disease due to the consumption of metal contaminated fish and shellfish are the 2 outbreaks of mercury poisoning in Japan. The earlier of these occurred in the Minamata Bay area, in Kumomoto Prefecture. The source of the mercury was a vinyl chloride and an acetaldehyde plant that discharged mercury contaminated wastewater into Minamata Bay and the Minamata River. During the period 1950 to 1960, the waste was discharged without treatment. Improvement in the treatment process in 1966 resulted in an abrupt decrease of the mercury content of fish in the discharge area.

During the period 1953 to 1960, 111 cases of mercury poisoning due to the consumption of fish or shellfish were reported. The death rate was 36.9 percent, but most of the survivors have suffered permanent and severe disability. That methyl mercury was the causative agent was confirmed by finding methyl mercury compounds in the waste, in fish and shellfish, and in the victims of the disease.

There was a similar outbreak of organic mercury poisoning in Niigata, Japan, resulting from discharges of an acetaldehyde plant. A total of 26 cases of methyl mercury poisoning, with five deaths has been documented.

The Minamata Disease incidents are examples of acute effects resulting from relatively shorttime exposures to a highly toxic material. Such episodes are relatively easy to detect, and if found in time, remedial and preventive measures can be undertaken. The more subtle health effects of man are those resulting from long-term exposure to low environmental levels of a toxic material or combinations of such toxicants. There is some knowledge, although not adequate, of the maximum total body burden of many toxicants from all sources that should not result in these long-term adverse effects and these are referred to in the development of safe tolerance limits in water, foods, and other media consumed by man or to which he may be exposed. Tolerance limits for metals, pesticides and radionuclides in shellfish have been proposed, based on the abovementioned and other criteria for their establishment.

There is no doubt that consumption of shellfish taken from polluted waters is hazardous. History has shown that diseases have occurred and, therefore, it is predictable that outbreaks will continue to occur. The frequency of occurrence is a function of not only the presence and quantities of domestic and industrial waste discharges, but also the occurrence and prevalence of specific bacterial or viral disease and non-symptomatic carriers of such diseases among the contributing population and the presence and quantities of toxic agents in the domestic and industrial waste discharges.

There are many unknowns in the picture. For example, at the time of the Minamata incident it was known that organic mercury compounds were toxic, but the extreme toxicity of methyl mercury was not known, nor was the fact that the bacterial action in bottom sediments can convert inorganic mercury to methyl mercury. There is still not a clear understanding of the long-range chronic effects of many metallic ions or organic compounds. The causative agent or agents of infectious hepatitis have not been identified, and cultural methods for these agent or agents have not been developed.

It should also be recognized that so long as shellfish are present in polluted estuaries, they will be enticing to sports fishermen and unscrupulous commercial fishermen. Resulting diseases will be inevitable. Patrol or polluted areas may have resulted in reducing the extent of bootlegging, but as history will demonstrate it has not eliminated the occurrence of disease. Elimination of pollution is the ultimate solution. A less desirable approach is the remova of shellfish from polluted areas. Obviously, it would be desirable to make productive use of these resources and there are methods available that to some extent and with certain contaminants these methods will result in the decontamination or detoxification of the mollusks.

Relaying of shellfish from polluted to clean waters has been practiced successfully for centuries. This procedure exploits the well known ability of mollusks by way of their feeding mechanisms and other physiological processes to attain equilibrium with the new clean aquatic environment. Equilibrium is attained fairly rapidly in the case of bacteria and viruses, but, in the case of metallic ions and toxins, it proceeds slowly, requiring many months with some agents.

Relaying involves some risks. These include mortality of shellfish and the continued possibility of poaching. Little can be done about the former, except to conduct the program at periods of optimal activity of the shellfish and to avoid as much as possible the opportunity for the ravages of predators. Poaching can be minimized by proper selection of the clean water area, tight patrolling of the area, and control of harvesting, planting and reharvesting.

Controlled purification, (depuration) utilizes the same biological principles, but differs from relaying in that the process is carried out in tanks on shore, using purified water, or in cribs or floats located in areas of extremely high sanitary quality. The high cost of facilities construction, handling of the shellfish and power costs for pumping place severe limitations on the period of time of exposure of a given lot of shellfish to this process.

It would be economically feasible to provide for preferably 2 and not more than 3 days holding. Therefore, the depuration process would be applicable only to removal of bacteria and viruses. It has also been demonstrated that there is an upper limit of levels of bacteria and viruses beyond which the depuration process is unreliable. This limit has not yet been clearly defined, but it is quite definite with the present state of knowledge and within the time frame set by economic factors the depuration process would not be reliable with oysters showing the coliform densities that currently prevail in many of the beds in Pearl Harbor.

MR. O'CONNELL: Thank you very much, Mr. Kelly.

DR, QUISENBERRY: Mr. Kelly, in our tour yesterday, we discussed some of the data used in the report on the navigable waters in Pearl Harbor, and especially the confusion regarding the economic potentials of the shellfish industry in Pearl Harbor. I thought you gave us a good discussion on this yesterday. I wonder if you could clarify one point to go in with your report from what you gave us yesterday, so that we can have it in the record.

MR. KELLY: I think that the question is related to the possibility for oyster production in Pearl Harbor. Is that the point that you wanted, Doctor?

DR. QUISENBERRY: Yes, and there was some confusion about the type of oysters that were growing there, whether they were the Olympia oysters or -- what were you referring to?

MR. KELLY: Well, the species that are growing in West Loch in Pearl Harbor is the same species that grows on the east coast. The species name is Crassostrea virginica.

It is one that is used commercially, probably on the ratio of well,perhaps 7 to 3, nationwide. That's the type of ratio that I've taken off the top of my head, but it's oysters that will tolerate a wide range -- a worldwide range of salinity, and a particularly wide range of temperature; because it's found in northern Maine and it's also found in southern Mexico. We're talking about a temperature range close to 30° in height.

The reason why these are able to tolerate the temperature difference is because sometimes they have been climatized to the other environment. Obviously, that was the motivation of the species here. This species is not a native to Pearl Harbor. It has adjusted to the higher salinity in the habitat and somewhat higher temperature than you will find in the northerly regions of its habitat; but I think that it is important that the fact that it has propagated indicates that it has adapted itself to a closer range or a narrower range of temperature.

DR. QUISENBERRY: One more question, Mr. Kelly. At the beginning of this report, the indication was that the economic potential for the oyster industry in Pearl Harbor might be around $40,000 to $80,000 a year. I believe that you disagree with that figure, unless I misunderstood you.

MR. KELLY: Yes. I did; but my disagreement was based on the assumption that the complete potential of West Loch be exploited and applied; and once it's selected in a more confined area and efforts intensified, it can produce an amazing amount of shellfish in a very small area. I think that the example here is the tremendous production which is accomplished by the Japanese at Hiroshima Bay.

DR. QUISENBERRY: Thank you very much.

MR. STEIN: Mr. Kelly, do you know of any other place that you have the eastern oysters, or is it rather rare?

MR. KELLY: Well, I think it is rare. I don't know of any, but I wouldn't be surprised if there were some in the other harbors.

MR. STEIN: Would it be fair to say that this has the best known potential?

MR. KELLY: Yes, very definitely.

MR. STEIN: Well, I don't want to be possessive about this, but I know we both come from the east coast, but what would you think of the potential commercial availability of the eastern-type oyster out here? Now, when it is available, do you think there would be a demand for it?

MR. KELLY: Yes, I think that the visitors from the eastern coast to the State of Hawaii would be delighted to have oysters on the half shell, and I think that this is the reason why I have been expounding on the agricultural level which would produce the very desirable oysters.

MR. STEIN: I know that in the Washington restaurants, half a dozen eastern oysters sell for $1.50 and up.

I have one other point that I think you alluded to here. That is if you have contaminated oysters in an area where there are unscrupulous poachers who are selling, you are always faced with an epidemic. Again, we did have a case, as a matter of fact, where there was a hepatitis outbreak. We related the situation, and it was traced to the people who were going into what was a closed area, getting the shellfish, and putting them through their sources on the market. Again, if you experience this, all you can do is depend upon patrolling, because there are always people who get in the prohibited shellfish areas and help put them, in one way or another, on the market for human consumption.

MR. KELLY: Well, the case which was even more definitely proven -- and there were many, many cases of typhoid fever from oysters -- probably a large percent of them were the result of poaching.

MR. STEIN: Thank you very much.

DR. QUISENBERRY: Thank you, Mr. Kelly. To sum up the EPA's position, I would like to ask Mr. Freeman to please reappear.

FURTHER STATEMENT OF
RUSSELL FREEMAN
DIRECTOR, PACIFIC ISLANDS BASINS OFFICE
ENVIRONMENTAL PROTECTION AGENCY
HONOLULU, HAWAII

MR. FREEMAN: At this point, I would like to present the Environmental Protection Agency summary, conclusions, and recommendations on the basis of the testimony that you have heard before.

SUMMARY

In summary, we found that Pearl Harbor is ideal for a variety of uses. However, present uses of the harbor are limited to defense purposes, limited commercial bait fishing, sight-seeing and harvesting of "seed" oysters. Other uses are possible; however, pollution and unattractive aesthetic conditions prohibit consideration of expanding the variety of water use within the harbor.

A number of shellfish beds exist in West Loch of Pearl Harbor, and the State has a plan for development of this oyster resource. Pollution interferes with the harvesting of shellfish because of bacteriological contamination. If poached oysters were ingested without proper depuration a definite threat to health would occur.

A number of sources of municipal and industrial wastes discharge to Pearl Harbor either directly or by way of streams, sewers, and irrigation systems which eventually lead to the harbor. A great deal of planning and administrative action has taken place, but very little has been done to control wastes from the civilian community. The military has under construction or completed facilities to treat most of the conventional waste sources. However, a recent survey by the United States Navy has identified additional pollution sources to be controlled.

Very little has been done to remedy the cause of some other pollution problems such as discharge of vessel wastes and thermal wastes.

Efforts to control sediment have met with limited success.

Use of the Waipahu Dump has been curtailed, but it still constitues a source of pollution to waters of West Loch.

Plans of the city and county call for collection and treatment of most municipal wastes presently discharged to Pearl Harbor. However, proposed systems are of relatively low priority as compared to other programs and other sewerage systems throughout the State. Plans keep changing, proper State and Federal concurrence in these plans has not been obtained, and the schedule for implementation is not timely.

CONCLUSIONS

In conclusion, I would like to state first that untreated or improperly treated wastes are entering Pearl Harbor from Federal, municipal and industrial sources. These wastes are adversely affecting the natural aquatic resources of the harbor.

Secondly, bacterial contamination of the oysters in West Loch is occurring due to the presence of improperly treated municipal wastes. These conditions create a health hazard for persons who come in contact with the water or ingest the contaminated oysters. These conditions also interfere with the State's efforts to develop the oyster beds.

Sediment and debris are interfering with propagation of oysters and creating undesirable aesthetic conditions, reducing the water area and interfering with navigation. Where attributable to man's actions, sediment discharges constitute a violation of State-Federal water quality standards.

Further, there are numerous violations of the water quality standards. These include violations of basic requirements such as: freedom from materials that will settle to form objectionable deposits, color, odor, taste or turbidity; freedom from oil, scum or substances that will produce undesirable aquatic life; and provision of the best practicable treatment or control for waste prior to discharge. Violations of the water quality standards criteria were also found in the harbor for total and fecal coliform bacteria, dissolved oxygen, nutrients, and probably temperature. These violations are subject to abatement under State law.

Further, violations of the water quality standards preclude possible uses of the waters of Pearl Harbor, including, among others, the propagation, harvesting and marketing of shellfish.

RECOMMENDATIONS

We make the following recommendations. It is recommended that:

1. Inadequately treated municipal industrial

wastes be prevented from reaching Pearl Harbor and that all sources of pollution within 36 months be eliminated from West Loch.

2. Sources of sediment discharge to Pearl Harbor be identified, that a soil conservation program be developed to control natural sources, and that aggressive pollution abatement action be initiated to control sediment wastes attributable to actions of man.

3. Recommendations of the President's Water Pollution Control Advisory Board, some of which pertain to Pearl Harbor, be implemented.

We stand ready to present detailed recommendations with suggested timetables to the conferees.

That concludes the EPA presentation.

MR. STEIN: Are there any comments or questions? Hearing none, thank you very much for a very thorough presentation.

We may want to let the State and the city or other local bodies indicate what they have in mind. However, I think that, from the presentation, I would expect that we're going to have to handle, as well as the detailed implementation plans, the specifics that must be done, where and when it's to be done.

There are several problems I hope that the succeeding presentations will cover, and I believe that it might be that the Harbor Committee, in part, might feel that it's in their particular jurisdiction.

One, there are several remarks from the Federal presentation. There is a possible -- and I say possible -- lack of coordination between the military program and the public body. It is obvious if the military is willing to move ahead with the program, and has to hook up with the city system or the county system, that the system has to be ready. Otherwise, it is going to be faced with the problem of building the interim plants. This has to be worked out.

I see that the dump is still a continuing source of pollution, and the Federal report indicates that there is no plan yet, that the Federal people are aware of, for abatement of it. I know that we are going to get a detailed presentation, hopefully, from the other aspect of this. I don't think we're going to have any complete rundown, unless the people who come up will address themselves to these questions.

Are there any other comments?

Thank you very much for a very thorough presentation. Before we recess for lunch, we have requests for two very short statements. One is the request by Mr. Dale Trenhaile.

DALE TRENHAILE

STATEMENT OF
DALE TRENHAILE
REPRESENTING EMPLOYEES OF
PEARL HARBOR NAVY SHIPYARD
HONOLULU, HAWAII

MR. TRENHAILE: Mr. Stein, Congresswoman Mink, and other distinguished guests. I am representing the employees of the Pearl Harbor Navy Shipyard and other groups, and I am making a brief statement and presenting 3 resolutions with copies provided for the entry into the record.

MR. STEIN: Without objection, the resolutions will appear in the record as if read.

MR. TRENHAILE: However, I will only comment very briefly. They were initially prepared by the delegates of the American Federation of Technical Engineers, Local 121, Hawaii, to introduce at the State AFL/CIO Convention of the Hawaii State Federation of Labor which now represents over 50,000 affiliate members.

These resolutions which are being presented here today were adopted by that body.

Merwyn Lyons, President of the Honolulu Metal Council to whom I also serve as an environmental advisor, asked that I make a statement here and present these resolutions, also.

That organization represents all of the employees of the Pearl Harbor Naval Shipyard on an exclusive basis.

DALE TRENHAILE

During the near 30 years that I have been in Hawaii, I have watched the disposal problems become increasingly serious here, and the recovery of valuable material from this waste become less and less as time goes by.

I have seen the environment deteriorate, and the air, and the land, and the water become increasingly polluted, and have been active in numerous community organizations in an attempt to find ways of serving the human needs that we have and our environment and conservation of our resources.

Resolution Number 14, as it was numbered at the convention, is "Support Waste Treatment Program for Kaneohe/Sand Island/Ewa Areas."

We have asked that the Federal Government provide assurance that the Environmental Protection Agency and the Federal share costs to simultaneously proceed with all of these particular areas, and that they be made available as soon as possible; for we know that the longer it goes, the more it's going to cost, and the more work it's going to be.

Some of these areas it isn't really too bad yet, but it's on the way.

Resolution Number 15 is "Support Pearl Harbor Shoreline Cleanup Project." We would like to go on record as supporting the Federal, State, city and county for their shoreline cleanup projects, supporting the termination of the pollution sources from industrial, commercial construction, developers, road construction, private sources in the Pearl Harbor drainage basin which contributes to the degradation of Pearl Harbor, which many of you know may be a very beautiful place.

The last Resolution, Number 23, is with regard to asking that the State and the city investigate the disposal/ recovery system pilot plant that is being built by National Laboratories. This particular plant will handle total waste, everything from a prune seed to a truck. Only a small percentage of it actually needs to be trucked or hauled. And one of the bases of this particular plant is that many of the common things that we have now -- rubbish that is of a reasonable small size -- would go into the system that is spread out, putting it into a condition to go into the sewer line. And this would, of course, reduce traffic on the road, reduce costs all the way around. And the material that goes in from the sewer lines that goes into the reclamation projects, and also the very large items would go in trucks.

From it we get back water, pure enough to drink if you want to, and all types of other things for use in manufacturing: paper, metals, and many, many other things, including fuel. We would ask that all of these resolutions be considered, and I thank you all very much.

(The above-mentioned resolutions follow)

RESOLUTION NUMBER 14

SUPPORT WASTE TREATMENT PROGRAM FOR KANEOHE/SAND ISLAND/EWA AREAS

"WHEREAS, the Fourth Biennial Convention of the Hawaii State Federation of Labor, AFL-CIO, will convene from Friday, September 17 through Sunday, September 19, 1971 in Honolulu,

"WHEREAS, an important subject believed suitable for consideration of the Convention is: The rapid and timely improvement of waste water treatment, Island of Oahu, State of Hawaii with the resulting environmental improvement relating thereto:

"WHEREAS, the City and County of Honolulu has developed a master plan for sewage collection and treatment facilities in the Kaneohe/Sand Island/Ewa areas, which will significantly improve quality of surrounding Island waters when implemented; and

"WHEREAS, the City Charter requires full funding for construction contracts, with reimbursement for State and Federal expenditures as outlined in related grants programs; and

"WHEREAS, 60 million dollars is needed to commence the City and County waste water treatment program simultaneously so as not to result in further harmful degradation of the environment; and

"WHEREAS, under current Federal cost-sharing regulations, these costs cannot be met by all parties concerned (including the Federal Government) to implement the program in the time schedule required:

"Now therefore, BE IT RESOLVED that the Convention go on record as supporting efforts to obtain Federal/State funding support commensurate with Federal/State needs to enable City and County to proceed as rapidly as possible with its complete waste water treatment program;

"And, BE IT FURTHER RESOLVED that Federal Government provide assurance that Environmental Protection Agency (Federal) share of these costs is available fully and on the same time schedule as proposed by the State and local governments;

"And, BE IT FURTHER RESOLVED that officials of this Convention inform the Administrator, Environmental Protection Agency, State of Hawaii Congressional Delegates, Governor of the State of Hawaii, Mayor of the City and County of Honolulu, Secretary of the Navy, and Commandant, Fourteenth

Naval District of the action taken at this Convention." Submitted by: American Federation of Technical Engineers, Local 121 from Delegate Dale Trenhaile.

9/19/71 - ADOPTED by vote of the Convention assembled.

RESOLUTION NUMBER 15

SUPPORT PEARL HARBOR SHORELINE CLEANUP PROJECT

"WHEREAS, the Fourth Biennial Convention of the Hawaii State Federation of Labor, AFL-CIO, will convene from Friady, September 17 through Sunday, September 19, 1971 in Honolulu,

"WHEREAS, an important subject believed suitable for consideration of the Convention is: Pollution of the waters of Pearl Harbor prevents full enjoyment of its potential and impedes systematic management of the environment and the ultimate incremental expansion of the use of the Harbor for further recreational purposes; and

"WHEREAS, the Navy has a documented program to abate all Navy pollution sources in the Pearl Harbor Basin; and

"WHEREAS, Pearl Harbor region is the location of a National Historic Memorial, the U.S.S. Arizona, and whereas the Naval Base area has been declared a National Historic site and is visited by several hundred thousand tourists each year; and

"WHEREAS, the Navy has a documented plan for shoreline cleanup of Pearl Harbor which will be of benefit to the many visitors and all communities surrounding the 35-mile Pearl Harbor shoreline;

"Now therefore, BE IT RESOLVED that the Convention go on record as supporting Federal/State/City and County shoreline cleanup; supporting the termination of pollution sources from industrial/commercial/construction developers/road construction/private sources in the Pearl Harbor Drainage Basin which contribute to the degradation of Pearl Harbor;

"And, BE IT FURTHER RESOLVED that officials of this Convention inform the Administrator, Environmental Protection Agency, State of Hawaii Congressional Delegates, Governor of the State of Hawaii, Mayor of the City and County of Honolulu, Secretary of the Navy, Commandant, Fourteenth Naval District, Secretaries of Interior & Agriculture, Director, Federal Highway Administration, and the Director, Federal Housing Authority, of the action taken of this Convention." Submitted by: Dale Trenhaile, American Federation of Technical

Engineers, AFL-CIO, Local 121.

9/19/71 - Motion for ADOPTION was carried by vote of Convention assembled.

RESOLUTION NUMBER 23

DISPOSAL/RECOVERY SYSTEM

"WHEREAS, the Fourth Biennial Convention of the Hawaii State Federation of Labor, AFL-CIO, will convene from Friday, September 17 through Sunday, September 19, 1971 in Honolulu,

"WHEREAS, an important subject believed suitable for consideration of the Convention is Waste Disposal Recovery Systems; and

"WHEREAS, a concise description of such systems is provided in the technical magazine 'POWER' on Pages 86 and 87 under the ENVIRONMENTAL MANAGEMENT Section in the article entitled, 'NEW WRINKLE IN SOLID-WASTE DISPOSAL-RECOVERY SYSTEM' for pilot plants planned by national laboratory features transportation of solid wastes in sewer mains; and

"WHEREAS, the economic and environmental situation in the State of Hawaii is seriously affected in adverse ways because adequate systems are not in operation for handling sewage, garbage and waste materials and partial recovery from these materials,

"THEREFORE, BE IT RESOLVED that the Convention go on record as recommending that the State and Counties of Hawaii investigate the possibilities of implementing efficient waste disposal-recovery systems to effect environmental improvements and cost reductions by providing a practical waste management system for sewage, garbage and other wastes which will reduce traffic, reclaim energy and resources such as wastes, soil, metals, basic materials suitable for recycle and for manufacturing of paper, building materials, chemicals etc., and to eliminate polluting effluent;

"And, BE IT FURTHER RESOLVED that officials of this Convention inform State of Hawaii Congressional Delegates, and other appropriate Government officials Hawaii Governor John A. Burns, Honolulu Mayor Frank F. Fasi, Administrator, Environmental Protection Agency, Commandant of the Fourteenth Naval District, plus the news media." Submitted by: American Federation of Technical Engineers, Local 121.

"NOTE: Submitted by the writer, Delegate

Dale Trenhaile of AFTE, in long draft form with copy of the article mentioned in the third WHEREAS. It was rewritten to shorter form and standard format, then recommended by the CONVENTION RESOLUTIONS COMMITTEE for adoption by the assembled Convention. The Resolution was adopted as presented to the Convention body. September 19, 1971."

MR. STEIN: Thank you very much.

Just before lunch, we will hear from Mr. Los Banos.

STATEMENT OF

DOMINGO LOS BANOS

SUPERINTENDENT

LEEWARD SCHOOL DISTRICT

HONOLULU, HAWAII

MR. LOS BANOS: Mr. Chairman, Water Pollution Advisory Board. My name is Domingo Los Banos. I am Superintendent of the Leeward School District, which is presently made up of 28 schools stretching from the communities of Pearl City to Waianae. Of these 28 schools, 17 schools fringe the Pearl Harbor area located in the communities of Pearl City, Waipahu, and Ewa Beach. This represents some 17 schools and 20,277 students. By 1975 the Advanced Planning Branch of the Department of Education projects the addition of 4 schools in these communities. This means an additional 4,000 students.

The schools then are a good barometer of community growth. It is established that the Leeward area is definitely an area of growth. For this reason I heartily endorse the efforts to clean up Pearl Harbor as well as taking positive means to handle pollution problems permanently so that the people in these communities can live under the best of healthful conditions.

It has also come to my attention that the Navy would eventually open up certain areas of Pearl Harbor for public use. I see this as a potential resource for expanding the outdoor educational programs and the science programs of the schools. Presently the 4 camping facilities on Oahu are taxed to the limit in serving all 157 schools on Oahu.

I welcome this opportunity to make testimony to this body and hope that all governmental agencies will close ranks in coordinated fashion giving high priority to making Pearl Harbor pollution-free.

MR. STEIN: Thank you, Mr. Los Banos. Any comments or questions? Hearing none, we will stand recessed for lunch. We will return at 2:00 o'clock, and when we return, the first statement will be by Representative of Governor Burns, Dr. Marland.

(RECESS)

(The meeting was reconvened at 2:00 P.M.)

MR. STEIN: Dr. Quisenberry.

DR. QUISENBERRY: Thank you very much, Mr. Chairman. We will start this afternoon's session by calling on Mr. Kenji Ego of the Department of Land and Natural Resources, Division of Fish and Game. Mr. Ego.

MR. STEIN: While we are waiting for Mr. Ego to come up, let me indicate what we are going to do. We are going to have presentations from 3 people from the State. Then we will turn to citizens' groups -- first the Federal people, State people, and citizens' groups. I have listed Stanley Sumida and George Nobunaga to come up this afternoon. If we have time after that, we will proceed with the official presentations.

Mr. Ego, you may proceed.

STATEMENT OF

KENJI EGO

DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF FISH AND GAME

HONOLULU, HAWAII

MR. EGO: Walking up to this lectern, the thought entered my mind, what with this business of human population explosion facing and staring at us so stoically, rather than compound the problem it may be wise at this time not to talk about the development of the oyster resources in Pearl Harbor anymore. That's just a passing thought, and not for the record.

Ladies and gentlemen, my name is Kenji Ego, and I am here representing the Department of Land and Natural Resources.

My testimony consists essentially of comparing oyster survey results made at West Loch, Pearl Harbor in 1962 with a survey that was just concluded.

Before proceeding further, however, I would like to offer some background information and also do some backtracking.

The ostreaceous oysters that are native to our waters are either small in size or relatively few in numbers such as the _Ostrea sandwichensis_ and the _Ostrea thaanumi_. They are found in bays such as at Kaneohe and Pearl Harbor, but because of their diminutive size or restricted numbers they are, for the most part, not utilized for human consumption. On the other hand, the oysters that are receiving attention and for which developmental potential exist are the introduced species.

Records indicate that this introduction of oysters into Hawaii may have begun as early as 1871 and was continued to about 1956. During this period, the American or Eastern oyster, the Olympic oyster, the Pacific or Japanese oyster, the Australian oyster, the coral rock oyster and the Indian oyster were planted in our waters. Of these, the American oyster, _Crassostrea virginica_, and the Pacific oyster, _Crassostrea gigas_, became firmly established in Pearl Harbor and at Kaneohe Bay respectively. The American oyster flourished particularly well in West Loch of Pearl Harbor; thus, a survey was conducted in March of 1962 by the Division of Fish and Game under the direction of Dr. Albert K. Sparks, a shellfish authority contracted by the State.

As a result of this survey, information on oysters in West Loch and a discussion on the potential of growing oysters in other areas of the State were presented in a report by Dr. Sparks entitled "Survey of the Oyster Potential of Hawaii." In his findings, Dr. Sparks reported the presence of 19 major beds of American oysters in West Loch containing a total of some 55,630 bushels of live oysters. He also mentioned that water samples collected from stations over the oyster beds showed gross bacteriological contamination making the oysters unsuited for direct marketing purposes.

He therefore suggested that the oysters be utilized only for brood and transplanting purposes. He recommended that further studies be made to gain knowledge of the biology of the oysters in West Loch to provide information pertinent to the utilization and management of this resource. The Division of Fish and Game of the State Department of Land and Natural Resources has, since then, actively pursued a program of studies on the biology and the development of techniques for the culture of American oysters in Hawaii.

To update available information and to assess changes that may have occurred over the 9-year span between Dr. Sparks' survey and the present, a re-survey of the oyster beds at West Loch was implemented recently and just concluded this month.

Generally, the re-survey of the 19 major oyster beds in West Loch followed the procedures used by Sparks and involved: 1) measuring the size of each oyster bed, 2) estimating the number of oysters per square yard on each bed, 3) collecting oyster samples to determine the Condition Index or fatness, and 4) determining the temperature, salinity and coliform levels of the waters over the beds.

Prior to this survey, we were of the impression, from our work being continued at West Loch, that various oyster beds surveyed in 1962 had been increasing in size due to natural seeding. A significant finding of the re-survey was the tendency of individual beds to expand and coalesce with each other such as at Walker's Bay, Loch Point, Three Rock with Salt Bed, Gilbert's with Gilbert's Little Bed and with Honouliuli Station Bed, Laulaunui with Yoshida Bed, and the Honouliuli Parallel with the Mid-Channel Bed complex. Also, One Rock and Three Rock Beds are now connected to oysters growing along the shoreline.

In comparison with the 1962 survey, 8 of the 19 oyster beds showed a decrease in total area while the other 11 beds showed increase in size. This change in individual beds, however, is not too meaningful for, as mentioned earlier, many of the beds had joined together and, in measuring off the beds, the boundaries selected as junctures between beds were of necessity done on the basis of best judgment and therefore there is a definite element of arbitrariness in the ultimate size calculated for some of the beds.

In consequence, comparisons of the 2 surveys will be made hereafter of total figures estimated for the entire 19 beds.

In respect to oyster bed size, an overall increase of 40 percent was obtained. That is, from 150,000 square yards in 1962, the total area of oyster beds had increased to 210,000 square yards in 1971.

Over these 19 beds we now estimate that there are 34,600,000 oysters as compared to the 35,600,000 estimated for 1962 or a decrease of about 3 percent. Thus, the density in terms of numbers of oysters per square yard has declined, and in view of the increase in bed size this decline in density amounts to about 34 percent. Just an examination of density, however, is misleading for, besides frequency, the size of the individual bivalve affect the amount of biomass per unit area.

In 1962, it took an average of 641 oysters to fill a bushel while the recent survey showed that 274 oysters make a bushel. On the average the oysters are now more than double the 1962 size and a square yard of oyster bed now carries about 6/10 of a bushel of oysters as compared to a little more than 1/3 of a bushel in 1962. As to total bushels, in 1962 it was estimated that the beds carried 55,630 bushels while the estimate now is 126,459 bushels or an increase of 127 percent.

Sampling for water conditions during the recent survey showed that water temperature and salinities varied very little among the beds. Temperatures ranged between 26 to 27°C and salinities ranged from 30.0 to 32.8°/oo.

Bacteriological analysis made of water samples collected from 17 of the 19 beds showed that the total coliform counts of 10 of the 17 beds fell within the Approved Standard of 70 coliform MPN per 100 ml. This bacteriological analysis is, of course, of water samples collected at only one particular point in time and therefore, caution must be exercised over unwarranted optimism.

Inasmuch as oysters from West Loch are not being sold legally because of the unacceptable water quality of the growing waters -- please note that I qualified my remarks with the word "legally" for we are aware that poaching and selling activities are occurring -- discussions on dollar value of this resource becomes somewhat academic. In any case, were we to assign a value of $4.00 per bushel to our oysters, then simple arithmetic immediately tells us that the 126,000 bushels of oysters will be worth slightly more than half a million dollars to the primary producer. To attempt to project production in terms of sustaining annual yields may be somewhat premature at this time but when it is realized that oysters in West Loch can attain 3 inch size within a period of 1 year and when it is further realized that the present propagation of oysters there is occurring only through natural seeding while the possibility presents itself of intensive management together with the development of additional beds then it may not be too far fetched to project the present standing crop of about 126,000 bushels as the yearly sustaining yield.

As mentioned earlier, the matter of sustaining yield remains moot for the direct utilization of the oyster still hinges on water quality. However, should the day arrive when oysters from West Loch can be harvested for direct human consumption then, pending naval security requirements, serious consideration should and will be given the possibility of reserving as much of the resource as possible for recreational harvest. This will assure greatest public benefit by providing badly needed outdoor recreational outlet and the opportunity, even if to a limited extent, of satisfying some of the atavistic food gathering urge that exists in all of us -- opportunities that are becoming increasingly scarce and precious on this island because of the increasing press of human population.

Now I don't believe there is a man wise enough who can tell us when that day will arrive when oysters can be harvested for direct human consumption from Pearl Harbor waters. Hopefully, it isn't too far off. In any case, those among us who have been working with this problem are optimistic that by transplanting or by depuration or both, oysters from West Loch can be cleansed for marketing purposes. We have submitted such a scheme to our Department of Health, and they are now very cautiously, and rightly so, evaluating our proposal.

This concludes our department's testimony. At this time, I would like to point out that copies of our report are available on the table there, and I would also request that that report be made a part of our testimony.

MR. STEIN: Without objection, the report will be included in the record as if read.

(The following report was presented by Mr. Ego to be included in the record.)

A RE-SURVEY OF THE OYSTER RESOURCE IN WEST LOCH, PEARL HARBOR

INTRODUCTION

In March of 1962, a survey was conducted of the natural beds of American oysters (*Crassostrea virginica*) in West Loch, Pearl Harbor on the Island of Oahu by the Division of Fish and Game under the direction of Dr. Albert K. Sparks, a shellfish authority contracted by the State. As a result of this survey, information on oysters in West Loch and a discussion on the potential of growing oysters in other areas on the State were presented in the report "Survey of the Oyster Potential of Hawaii" (Sparks, 1963).

In his findings, Dr. Sparks reported the presence of 19 major beds of American oysters in West Loch (Figure 1) containing a total of some 55,630 bushels of live oysters. He also mentioned that water samples collected from stations over the oyster beds showed gross bacteriological contamination making the oysters unsuited for direct marketing purposes. He therefore suggested that the oysters be utilized only for brood and transplanting purposes. He recommended that further studies be made to gain knowledge of the biology of the oysters in West Loch to provide information pertinent to the utilization and management of the shellfish resource.

The Division of Fish and Game of the State Department of Land and Natural Resources has, since then, actively pursued a program of studies on the biology and development of techniques for the culture of American oysters in Hawaii.

In October of 1969, the Federal Water Pollution Control Administration (presently called Environmental Protection Agency) conducted a survey of the oyster beds in West Loch to determine whether or not there had been a reduction in the size of oyster beds since Sparks' survey in 1962. The FWPCA describes this survey in their "Report On Pollution of the Navigable Waters of Pearl Harbor" (FWPCA, 1969). To obtain the sizes of the oyster beds, FWPCA used aerial photographs of the area that were taken by the U. S. Navy Fleet Air Photographic Laboratory during low tide on February 18, 1969. Measurements of 11 of the exposed beds were taken from the photographs, and a field survey was made to verify the presence of live oysters on these beds. It was then concluded that, "There has been approximately a 50 percent average decrease in the size of the oyster beds compared."

In West Loch, only the highest points of the oyster beds are exposed out of water during periods of low tide leaving a greater portion always submerged. In view of this, it is felt that aerial photographs do not reveal the extent of oyster distribution underwater and therefore, a survey was initiated in August 1971 to reexamine the stock of American oysters in West Loch and assess changes that may have occurred during the 9-year span between the survey of Dr. Sparks in 1962 and the present.

This report describes the survey methods used and the results obtained from examination of the 19 oyster beds.

METHODS AND MATERIALS

Generally, the re-survey of the 19 major oyster beds in West Loch followed the procedures used by Sparks (1963) and involved: 1) measuring the sizes of each oyster bed, 2) estimating the number of oysters per square yard on each bed, 3) collecting oyster samples to determine the Condition Index (fatness), and 4) determining the hydrographic (temperature and salinity) and sanitary (total and fecal coliform levels) conditions of the waters over the oyster beds.

Estimating the Size of Oyster Beds

The size of the oyster beds was estimated by walking out into the water along the edge of the beds, marking the periphery with bamboo stakes, and measuring distances with the aid of a transect line marked at 5-yard intervals. Where the oyster beds were irregular in shape, numerous stakes were driven and measurements taken to obtain a series of plots, the total of which then represented the estimated size of the oyster bed. Following the units of measure used by Sparks (1963), the oyster bed sizes were estimated in square yards.

Estimating the Density of Oysters on the Beds

In addition to determining the linear measurements of the oyster beds, the density of oysters on each bed was also estimated by taking 1 square yard samples from the seaward, middle and shoreward sections of each bed. All oysters in the sampling plot were then removed and the number of live oysters counted. The number of oysters per square yard from the 3 sample plots of each bed were then combined to provide an average number of live oysters per square yard for the particular bed. The total number of live oysters on each bed was then estimated by multiplying the total area of the bed by its average number of oysters per square yard.

We also determined the number of bushels of live oysters on each bed by obtaining the average number of oysters in a bushel from 10 random 1-bushel samples of oysters. The average number of oysters per bushel divided into the estimated total number of oysters on each bed then gave an estimate of the number of bushels of live oysters on the respective beds.

Determination of Oyster Condition

Samples of 10 oysters were also collected from each oyster bed to determine the fatness or marketable quality of oysters by the Condition Index, which is the ratio of the weight in grams of the dried meat to the volume of shell cavity in milliliters (obtained by determining the difference between the volume of water displaced by the 10 whole oysters and their empty shells) multiplied by 100. A Condition Index of 10 is commonly used as a standard of marketable quality for the American oyster.

Determination of Growing Water Conditions

Information on the temperature and salinities of the waters over the oyster beds in West Loch was also collected during the survey. In addition, water samples were collected for total and fecal coliform analysis by the State Department of Health to determine the sanitary quality of the growing waters.

RESULTS AND DISCUSSION

Prior to this survey, we were of the impression, from our work being continued at West Loch, that various oyster beds surveyed in 1962 had increased in size due to natural seeding. A replotting of the oyster beds as a result of this recent survey is presented in Figure 2 to update the general shapes of the oyster beds in West Loch. A significant finding of the re-survey was the tendency of individual beds to expand and coalesce with each other such as at Walker's Bay, Loch Point, Three Rock with Salt Bed, Gilbert's with Gilbert's Little Bed and with Honouliuli Station Bed, Laulaunui with Yoshida Bed and the Honouliuli Parallel and Mid-Channel Bed complex. One Rock and Three Rock Beds are now connected to oysters growing along the shoreline.

"To evaluate the relative status of the oyster beds of West Loch, comparisons are made using the data provided by Sparks (1963) with this survey. (Table 1)

Oyster Bed Sizes

In comparison with the 1962 survey, 8 of the 19 oyster beds showed a decrease in total area while the other 11 beds increased in size. Also, 6 of the 11 beds that were larger increased in significant amounts ranging from 106 percent to as much as 506 percent over the areas estimated in 1962.

A comparison of total areas covered by the 19 oyster beds examined between the surveys (150,000 square yards in 1962 against 210,024 square yards in 1971) show an overall increase of 40 percent.

Oyster Density

The density of oysters on the 19 beds surveyed was estimated in terms of number of oysters per bed and by the number of bushels (units of measure commonly used in oyster culture) of live oysters available on the beds.

In making the comparison, it should be noted that the average size of oysters sampled in 1971 had increased by more than double the 1962 samples. In 1962, it was estimated that 35,657,400 oysters would fill 55,630 bushels for an average of 641 oysters per bushel (Sparks, 1963) whereas an average of 274 oysters per bushel was obtained in this survey.

Comparisons of the estimated number of oysters on each of the 19 beds surveyed show that 7 beds now carry more oysters while the other 12 show a decrease. The increase in number of oysters were significantly high, particularly at Walker's Bay, One Rock, Matsuyama Submerged, Honouliuli Parallel, Yoshida, and Loch Point Beds ranging from 172 percent to 597 percent. The overall estimated number of oysters showed a slight decrease of 3 percent.

Since the comparison of number of oysters during 1962 and 1971 is complicated by differences in the average size of oysters, a more appropriate comparison would be the number of bushels of live oysters available. Generally, a bushel of large oysters would give the same poundage of oyster meats as a bushel of small size oysters of similar condition.

On the basis of numbers of bushels estimated for the 2 surveys, 6 of the 19 beds showed a decrease but, in essence, the 1971 estimate showed an overall increase of 127 percent over the 1962 survey. The most productive bed was Hoaeae-Waikele Bed with an estimated 27,000 bushels of oysters.

The effects of the differences in average size of oysters is exemplified at Salt Bed where the total area and estimated number of oysters decreased by 12 and 55 percent respectively. However, due to the larger size of the oysters now present on the bed, the total standing crop decreased only by about 100 bushels (-4 percent) of live oysters. Many other beds that showed decreases in numbers of oysters actually showed higher bushel yields over the

1962 estimates.

Oyster Condition

The results of oyster condition determinations (Table 3) gave Condition Indexes ranging from 3.2 to 7.8 with an average of 5.0 for the 19 beds indicating that the shellfish resource in West Loch is at a subcommercial level during the summer months.

Water Conditions

Water temperature and salinity readings showed very little variation among the beds (Table 4.) Temperatures ranged between 26 to 27°C and salinities ranged from 30.0 to 32.8°/oo.

'Results of available bacteriological analysis of water samples from the oyster beds indicate that at the time of sampling the waters over Three Rock, Salt, Honouliuli Parallel and Mid-Channel, and Laulaunui Beds were within the Approved Standard of 70 coliform MPN per 100 ml. One Rock, Yoshida and Hoaeae-Waikele Bed waters fell into the Conditional level while Walker's Bay, Waikele Point and Loch Point waters were in the Restricted category.

SUMMARY AND CONCLUSIONS

1. A survey of the American oysters in West Loch, Pearl Harbor conducted in 1962 by Dr. Albert Sparks showed

the presence of 19 major oyster beds containing an estimated 55,630 bushels of live oysters.

2. The Division of Fish and Game undertook a re-survey of the West Loch oyster beds in August and September of 1971 to update information on the shapes and sizes of the beds and to assess changes that have occurred during the 9-year span between the survey of 1962 and 1971.

3. Generally, the re-survey involved the examination of 19 major oyster beds, following procedures used by Dr. Sparks, to determine: (a) the area of the oyster beds, (b) the density of live oysters in numbers and bushels, (c) the relative condition (fatness) of oysters at this time, and (d) the hyrographic and sanitary conditions prevailing at this time.

4. The present survey revealed that since 1962, many of the oyster beds have changed in size and shape with some beds coalescing with adjoining beds or to beds of oysters growing along the shoreline of West Loch.

5. The 19 oyster beds examined show an overall increase of 40 percent in total area (from 150,000 square yards in 1962 to 210,024 square yards in 1971).

6. The estimated number of oysters on the 19 beds surveyed showed both increases and decreases between 1962 and 1971. Although 7 beds had significantly large

increases, a 3 percent overall decrease in numbers of oysters on all beds was realized.

7. In terms of bushels of live oysters, the most productive bed surveyed was Hoaeae-Waikele Bed with an estimated 27,000 bushels of live oysters.

8. A comparison of the total bushels of live oysters present over the 19 beds during the survey showed an increase of 127 percent (55,630 bushels in 1962 to 126,459 bushels in 1971).

9. The 5.0 average Condition Index determined for oysters from the 19 beds indicate that the shellfish resource in West Loch is at a subcommercial level during the summer months.

10. Water temperatures and salinities recorded over the oyster beds were relatively constant ranging from 26 to 27°C and 30.0 to 32.8°/oo respectively.

11. Available information on total coliform counts of the waters over 11 oyster beds indicate that at the time of sampling, Three Rock, Salt, Honouliuli Parallel and Mid-Channel, and Laulaunui Beds were within the Approved Standard of 70 coliform MPN per 100 ml."

(Attachments to the above Re-survey follow.)

LITERATURE CITED

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1969 Report on Pollution of the Navigable Waters of Pearl Harbor. Federal Water Pollution Control Administration, Pacific Southwest Region, U. S. Department of the Interior, October 1969, 76 pp.

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1963 Survey of the Oyster Potential of Hawaii. Division of Fish and Game, Department of Land and Natural Resources, State of Hawaii, 44 pp.

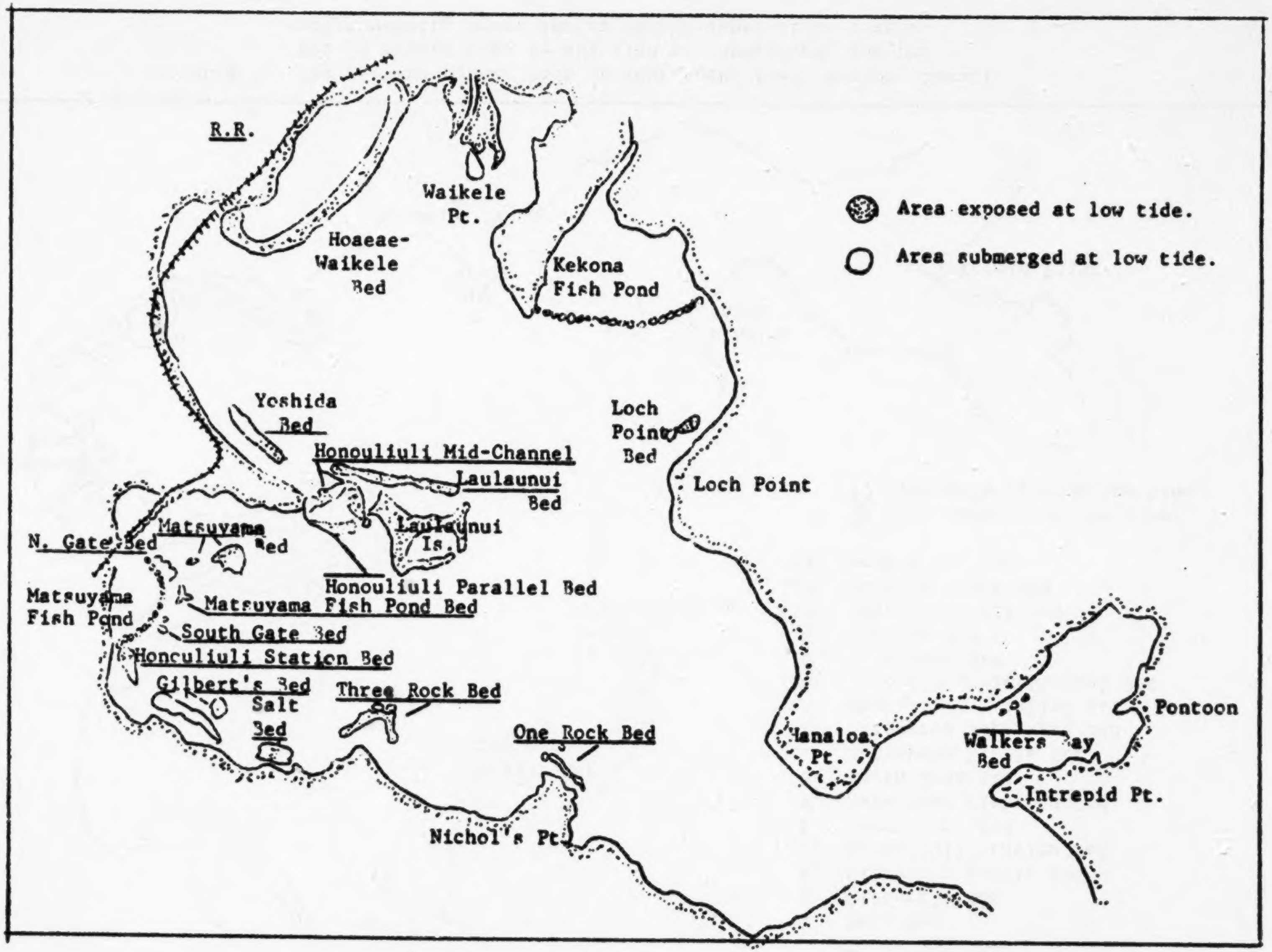
R.R.
Waikele Pt.
Hoaeae-Waikele Bed
Kekona Fish Pond
Area exposed at low tide.
Area submerged at low tide.
Yoshida Bed
Loch Point Bed
Honouliuli Mid-Channel
Laulaunui Bed
Loch Point
Matsuyama Bed
N. Gate Bed
Laulaunui Is.
Honouliuli Parallel Bed
Matsuyama Fish Pond
Matsuyama Fish Pond Bed
South Gate Bed
Honouliuli Station Bed
Gilbert's Bed
Salt Bed
Three Rock Bed
One Rock Bed
Hanaloa Pt.
Walkers Bay Bed
Pontoon
Intrepid Pt.
Nichol's Pt.

FIGURE 1. Oyster beds in West Loch, Pearl Harbor, Hawaii surveyed by Dr. Sparks in 1962.

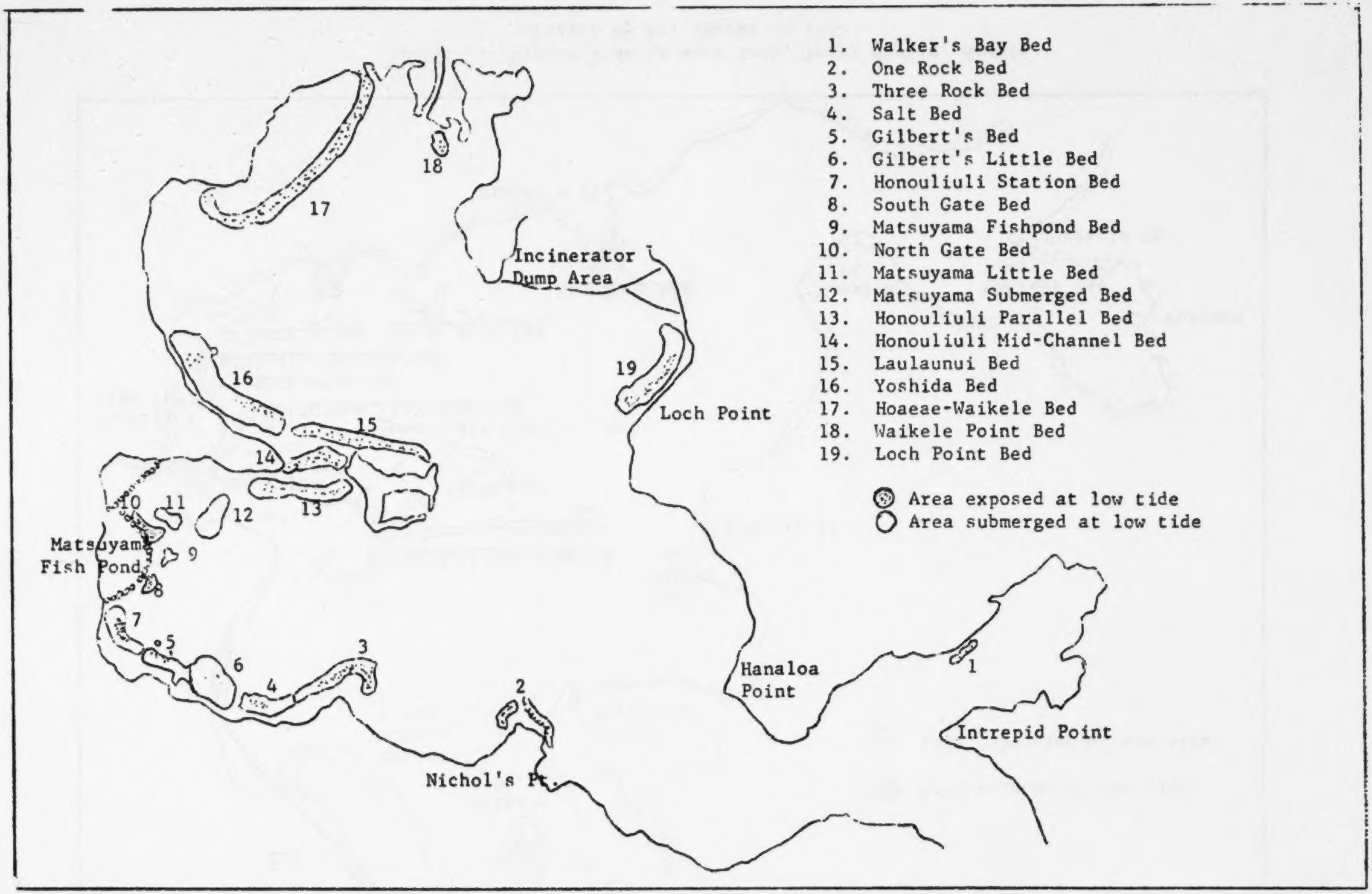
1. Walker's Bay Bed
2. One Rock Bed
3. Three Rock Bed
4. Salt Bed
5. Gilbert's Bed
6. Gilbert's Little Bed
7. Honouliuli Station Bed
8. South Gate Bed
9. Matsuyama Fishpond Bed
10. North Gate Bed
11. Matsuyama Little Bed
12. Matsuyama Submerged Bed
13. Honouliuli Parallel Bed
14. Honouliuli Mid-Channel Bed
15. Laulaunui Bed
16. Yoshida Bed
17. Hoaeae-Waikele Bed
18. Waikele Point Bed
19. Loch Point Bed
▨ Area exposed at low tide
○ Area submerged at low tide
Incinerator Dump Area
Loch Point
Hanaloa Point
Intrepid Point
Nichol's Pt.
Matsuyama Fish Pond
17
18
16
15
14
13
12
11
10
9
8
7
5
6
4
3
2
1
19

Figure 2. The present oyster beds in West Loch, Pearl Harbor, Hawaii. The 19 oyster beds re-surveyed are numerated, and the corresponding names appear in the upper right corner.

Table 1. Comparison Between the 1962 and 1971 Surveys of the Size and Density of Oyster Beds in West Loch, Pearl Harbor, Oahu.

Oyster Bed	No. Samples		Ave. No. Oysters yd.^{2}		Total Area (sq. yd.)		Est. No. Oysters/bed		Est. No. Bushels	
	'62	'72	'62	'71	'62	'71	'62	'71	'62	'71
Walker's Bay	1	3	117	112	500	2,360	88,500	264,320	200	965
					+372%		+199%			
One Rock	3	6	335	452	2,500	7,080	837,500	3,200,160	1,250	11,679
					+183%		+282%			
Three Rock	6	3	357	260	7,500	10,013	2,677,500	2,603,380	5,250	9,501
					+ 34%		- 3%			
Salt	3	3	349	179	4,700	4,160	1,640,300	744,640	2,820	2,718
					- 12%		- 55%			
Gilbert's	1	3	185	63	9,300	19,150	1,720,500	1,206,450	3,720	4,403
					+106%		- 30%			
Gilbert's Little	0	0	185*	63*	4,400	4,960	814,000	312,480	1,760	1,140
					+ 13%		- 62%			
Honouliuli Station	2	3	406	66	7,300	11,000	2,963,800	726,000	5,110	2,650
					+ 51%		- 75%			
South Gate	3	3	300	73	1,100	1,000	330,000	73,000	660	266
					- 9%		- 78%			
Matsuyama Fishpond	3	3	356	94	1,100	920	391,600	86,480	660	316
					- 16%		- 78%			
North Gate	0	3	368*	84	3,100	1,000	1,140,800	84,000	1,550	307
					- 68%		- 93%			
Matsuyama Little	3	0	380	262*	1,300	1,500	494,000	393,000	780	1,434
					+ 15%		- 21%			
Matsuyama Submerged	3	3	67	262	7,200	5,000	482,400	1,310,000	720	4,781
					- 31%		+172%			
Honouliuli Parallel	3	3	159	180	3,300	19,995	524,700	3,599,100	660	13,135
					+506%		+586%			
Honouliuli Mid-Channel	0	3	159*	112	18,000	12,480	2,862,000	1,397,760	3,600	5,101
					- 31%		- 51%			
Laulaunui	3	3	320	171	15,300	24,200	4,896,000	4,138,200	7,650	15,103
					+ 58%		- 15%			
Yoshida	0	3	67*	187	12,900	32,200	864,300	6,021,400	1,290	21,976
					+150%		+597%			

(continued on following page)

Table 1. Comparison Between the 1962 and 1971 Surveys of the Size and Density of Oyster Beds in West Loch, Pearl Harbor, Oahu.

(continued)

Oyster Bed	No. Samples '62	'72	Ave. No. Oyster/$yd.^2$ '62	'71	Total Area (sq. yd.) '62	'71	Est. No. Oysters/bed '62	'71	Est. No. Bushels '62	'71
Hoaeae-Waikele	3	3	289	232	43,000	32,000	12,427,000	7,424,000	17,200	27,095
					- 26%		- 40%			
Waikele Pt.	0	1	67*	79	3,400	3,006*	227,800	237,474	340	867
					- 12%		+ 4%			
Loch Point	0	3	67*	46	4,100	18,000	274,700	828,000	410	3,022
					+339%		+201%			
TOTAL	37	52	239	157	150,000	210,024	35,657,400	34,649,844	55,630	126,459
			- 34%		+ 40%		- 3%		+127%	

*Estimated

Table 2. Number of Oysters That Constitute One Bushel.

Sample No.	No. Oysters	Weight (lbs.)
1	265	49.5
2	200	42.5
3	229	48.5
4	270	52.5
5	242	50.5
6	328	65.5
7	272	50.0
8	277	48.0
9	257	51.6
10	401	59.0
$\bar{X}$	274	51.8

Table 3. Quality of Oyster Meats Collected from 19 Oyster Beds.

Location	Date Sampled	Condition Index
Walker's Bay Bed	Aug. 24, 1971	5.8
One Rock Bed	" " "	6.1
Three Rock Bed	" " "	5.7
Salt Bed	" " "	5.2
Gilbert's Bed	Sept. 9, 1971	3.4
Gilbert's Little Bed	" " "	3.4*
Honouliuli Station Bed	" " "	7.8
South Gate Bed	" " "	4.5
Matsuyama Fishpond Bed	Aug. 23, 1971	5.9
North Gate Bed	Sept. 9, 1971	4.6
Matsuyama Little Bed	" " "	3.2*
Matsuyama Submerged Bed	" " "	3.2
Honouliuli Parallel Bed	Aug. 24, 1971	5.5
Honouliuli Mid-Channel Bed	" " "	4.7
Laulaunui Bed	" " "	5.4
Yoshida Bed	Aug. 23, 1971	4.6
Hoaeae-Waikele Bed	" " "	5.2
Waikele Point Bed	" " "	6.3
Loch Point Bed	" " "	5.1

Average Condition Index = 5.0

* Estimated (Value of adjacent bed)

Table 4. Hydrographical and Sanitary Water Quality Data Collected over Oyster Beds in West Loch, Pearl Harbor, Oahu.

Date	Oyster Beds	Temperature ^{o}/C	Salinity ^{o}/oo	Coliform MPN per 100ml. Total	Fecal
Aug. 24, 1971	Walker's Bay	26.0	32.8	2,400	93
" " "	One Rock	26.0	31.8	93	43
" " "	Three Rock	27.0	31.1	Neg.	Neg.
" " "	Salt	26.0	30.7	9	Neg.
" " "	Honouliuli Parallel	26.0	30.7	4	Neg.
" " "	Honouliuli Mid-Channel	26.0	30.7	43	9
" " "	Laulaunui	26.0	30.7	23	4
" " "	Yoshida	27.0	30.1	460	23
" " "	Hoaeae-Waikele	26.0	31.8	460	23
" " "	Waikele Point	26.0	31.6	1,100	75
" " "	Loch Point	26.0	31.1	2,400	1,100
Sept. 13, 1971	Gilbert's	27.0	31.1	Data not available. Samples being processed.	
" " "	Gilbert's Little	27.0*	31.1*		
" " "	Honouliuli Station	27.0	31.1	"	
" " "	South Gate	27.0	30.7	"	
" " "	Matsuyama Fishpond	26.5	30.9	"	
" " "	North Gate	26.8	30.0	"	
" " "	Matsuyama Little	27.0*	31.1*	"	
" " "	Matsuyama Submerged	27.0	31.1	"	

*Estimated (Value of adjacent bed)

MR. STEIN: I believe that there may be some questions before we turn this --

When you came up you related to the connection of oysters to population explosion. However, as I understand it, we're dealing with the American oyster largely here, which is known universally as "virginica." (Laughter)

MR. EGO: Another thought entered my mind. If you wish, I shall share it with you.

Harking back to the toxic possibility in the oysters, maybe we should open up our Pearl Harbor oysters to human exploitation this very minute before the disease-producing effects of the oysters is manifested; why, maybe we would reduce the human population.

MR. STEIN: Just one moment. Mr. O'Connell has some questions.

MR. O'CONNELL: Just one. The thought seems to come to me -- a lot of thought seems to be coming into this -- but have you ever thought about the 100 percent increase in the size of these oysters in the past period of say 9 years?

MR. EGO: I don't think that we come out with any reasonable explanation for that. My oyster expert might have better thoughts on that. Mr. Henry Sakuda is our oyster expert.

MR. SAKUDA: I don't think that we have a reasonable explanation for that.

MR. STEIN: Thank you very much.

DR. QUISENBERRY: We will proceed with our State testimony. Our next speaker will be Dr. Henry Monnett, who is Chief of our laboratories of the State Department of Health.

STATEMENT OF
DR. HENRY MONNETT
CHIEF of LABORATORIES
STATE DEPARTMENT OF HEALTH
HONOLULU, HAWAII

DR. MONNETT: Thank you, Mr. Chairman. There are a couple of things that I have. I have spent some time in Louisiana and different parts of the country, and one of the commercial men told me that all of the fattest oysters are always around the sewer outfall. That might have some bearing on the size of our oysters.

Also, along the other line, there is a commercial oyster distributor in Louisiana who, across the back of his truck, has a sign that says, "Eat oysters and love longer." (Laughter)

The bacteriological survey of Pearl Harbor during the 2-month period of July-August, 1971: Oyster samples were collected from selected beds in West and Middle Lochs of Pearl Harbor by personnel of the Environmental Health Division on 3 separate occasions between July 13, 1971 and August 10, 1971. These samples were immediately transported to the Department of Health Laboratories in Honolulu for processing. Inoculation of culture media were made within 4 hours of the initiation of sample collection.

The oyster samples were bacteriologically assayed in accordance with Recommended Methods for the Examination of Sea Water and Shellfish (4th edition, 1970) and the Reference Manual for the Microbiological Examination of Foods (National Academy of Sciences, 1971).

The temperature of the dry-air incubator (for total coliforms and salmonellae) and the circulating water bath (for fecal coliforms) were monitored twice daily. The temperatures did not vary beyond the accepted limits.

Coliform determinations were by the 3-tube MPN technique utilizing standard lactose broth (presumptive coliform), brilliant green bile lactose broth (confirmed coliform), E.C. broth (fecal coliform), and the standard media and reagents for IMVIC reactions (E. coli).

Salmonellae isolation was attempted using GN broth as pre-enrichment and tetrathionate broth for enrichment. Four selective agar plating media were used:

Bismuth sulfite agar, brilliant green agar, SS agar and XLD agar. Suspicious colonies were picked to TSI agar slants, and biochemical confirmation was done utilizing urease, indole, lysine, KCN, MRVP, citrate, lactose (1% and 10%), sucrose, dulcitol, mannitol and motility test media.

Sampling sites were the same as those sampled by the Environmental Protection Agency.

As a result, appended to my testimony is Table 1, giving the results of the total and fecal coliform and E. coli testing on July 13, July 19, and August 10, 1971.

In looking at the results of these samples, and comparing them with the results of the EPA samples taken approximately the same days -- sample 1 was taken a day after the EPA sample -- sample 2 and sample 3 correspond with sample 2 and 4 of the EPA results -- it will be noted that the results confirm in general the results of the EPA, in that only 1 area was consistently good, and that was Station Number 4, which was Salt Bed; in which all samples that were taken came under the recommended 230 total fecal coliform. One of the samples at Middle Loch, which is in Class A also was under this category.

TABLE I
E. Coli, Fecal and Total Coliform Levels in Oysters
THREE SAMPLES
July - August 1971

		MPN Per 100 Gm		
tation mber	Description	Sample No. 1*	Sample No. 2*	Sample No. 3*
1	Walkers Bay			
	E. coli	2,400	36	1,500
	Fecal Coliform	4,600	230	4,600
	Total Coliform	24,000	930	46,000
2	Loch Point			
	E. coli	4,600	460,000	4,600
	Fecal Coliform	24,000	1,100,000	15,000
	Total Coliform	110,000	2,400,000	210,000
3	Laulaunui Bed			
	E. coli	46,000	36	150
	Fecal Coliform	110,000	230	430
	Total Coliform	1,100,000	930	4,600
4	Salt Bed			
	E. coli	30	<30	<30
	Fecal Coliform	30	91	36
	Total Coliform	930	430	2,400
5	One Rock Bed			
	E. coli	230	200	36
	Fecal Coliform	1,500	4,600	150
	Total Coliform	11,000	24,000	2,400
6	Middle Loch-West Shore			
	E. coli	--	150	<30
	Fecal Coliform	--	150	36
	Total Coliform	--	2,400	1,200
7	Middle Loch 200 yds. from Pearl City Outfall			
	E. coli	--	73	2,400
	Fecal Coliform	--	1,500	11,000
	Total Coliform	--	4,600	750,000

*Sample No. 1 - Collected July 13, 1971
*Sample No. 2 - Collected July 19, 1971
*Sample No. 3 - Collected August 10, 1971

MR. STEIN; Thank you. The table will appear in the record.

Are there any questions?

MR. O'CONNELL: I assume that these are different from those referred to by Mr. Ego.

DR. MONNETT: These are only on the oysters taken these 3 times. Now we have done types of samples for Mr. Ego on several occasions in the past over a certain number of years. We have done 1 sample in the past, and these were submitted only by number. And we do not know the exact location of the waters nor the oyster samples that were taken, where they were taken from.

MR. O'CONNELL: I noticed that Mr. Ego referred to water quality and you're referring to oysters.

MR. STEIN: If there are no further questions or comments, thank you very much.

DR. QUISENBERRY: We will hear now from Mr. Shenji Soneda. Mr. Soneda is the Chief of the Environmental Health Division in the Department of Health. In this division we have a Sanitary Engineering Branch which makes possible water pollution abatement.

SHENJI SONEDA

STATEMENT OF
SHENJI SONEDA
CHIEF, ENVIRONMENTAL HEALTH DIVISION
DEPARTMENT OF HEALTH
HONOLULU, HAWAII

MR. SONEDA: Mr. Chairman, conferees, ladies and gentlemen; my name is Shenji Soneda. I am Chief of the Environmental Health Division of the State Department of Health.

The propagation of shellfish is one of the protected uses for Class AA waters recognized in the water quality standards of the State of Hawaii. The only area of Pearl Harbor established by the State as Class AA waters is at the closed end of the Loch, more specifically, that portion of West Loch lying north of a tangent drawn from Nichols Point to Loch Point.

Until very recently, raw sewage from the Waipahu Community Sewerage System was being discharged into the Class AA portion of West Loch. This is the discharge mentioned on Page 2 of the Federal Water Pollution Control Administration's October 1969 Report on Pollution of the Navigable Waters of Pearl Harbor. On Page 3 of that report, a recommendation is made that "waste flows from the Waipahu sewerage system.......should immediately be prevented from entering the Class AA zoned waters in West Loch or waters in the vicinity of any existing oyster beds." The author of the report further notes that "these flows can be used for irrigation, ponded, or temporarily diverted to Middle Loch until suitable handling or treatment is provided."

A notice of the applicability of the standards of water quality for the Pearl Harbor waters including the waters of West Loch was published by the Department of Health in the local papers on March 6, 1970. On May 4, 1970, a waste discharge permit application was submitted by the city and county of Honolulu. A waste discharge permit (No. 572) was issued by the Department of Health on October 26, 1970 on the basis that oxidation ponds would be constructed in the peninsula between West and Middle Lochs. The Waipahu sewage according to the implementation plan submitted, was to receive the equivalent of a secondary treatment in these ponds and, after chlorination, the effluent was to be diverted to Middle Loch. The scheduled completion date of this project was October of this year. The construction plans for the ponds were reviewed and approved by the Department of Health. In spite of the unforeseen interjection of a west coast dock strike, the project was completed ahead of schedule and the waste flow was diverted into the ponds approximately a week ago.

SHENJI SONEDA

This is by no means the final chapter for the sewage from the Waipahu Community. Dr. Marland will be elaborating upon the plans for the eventual regionalization of the domestic sewage flows originating in the major part of the Pearl Harbor Basin and the possible future export of the treated effluent from the basin. The Department of Health has under review all of these waste flows in the Pearl Harbor Basin and we anticipate that within 6 months we will have these discharges covered under a permit or other appropriate administrative mechanism. The city and county of Honolulu has for the present managed to eliminate the last known source (civilian) of raw sewage discharge in the Pearl Harbor Basin and at the same time contributed to the upgrading of the quality of the Class AA waters of West Loch by the diversion of the effluent away from these sensitive waters.

Although this doesn't have much to do with the water quality, more than a year ago there were some refuse also being pushed into West Loch, and we asked the city to stop this, and they immediately complied but in order to manage the refuse, they requested authority to a sanitary landfill operation of this type with the edge of the operation much removed from the West Loch

[illegible]. but recently, it has come

to our attention that some unpleasant smells are being emanated from the area. For the record, I would like to submit a letter dated September 8, 1971 from the State Director of Health to the Chief Engineer, Department of Public Works of the city and county of Honolulu, which reads as follows:

"We are very concerned with the improper operation of the Waipahu landfill site during the past months because of the constant fire and smoke problems and the continued disposal of combustible solid wastes at the site.

"From your letter of April 16, 1970 we understood that the Waipahu site will receive only incinerator ash and non-combustibles when the Waipahu incinerator was put into operation back in the fall of 1970."

So the Director concluded in his letter that, "In view of the potential health nuisances and fires from combustible refuse that persist to be dumped under the present operation," he was "officially notifying the City and County of Honolulu to cease using the Waipahu site for the disposal of combustible refuse," and gave the city and county an order to adjust the operation to comply with this order within 90 days from the date of the letter.

That completes my testimony.

MR. STEIN: Are there any comments or questions?

DR. QUISENBERRY: Mr. Soneda, do you have any further comments regarding the oxidation ponds? I committed him to do some commenting on this. There were questions raised as to the size and the adequacy and the length of time that they would be used, and the safety factors concerned with them. Would you comment on those, please?

MR. SONEDA: First of all, regarding the safety consideration, when it was time to be reviewed originally, it was being reviewed with the understanding that the ponds were to be located in rather isolated places within areas controlled by the sugar plantations. And it is so located. However, by the expression of people surrounding the area, there appears to be some concern by the public that there might be some children going through the area and that fencing might be indicated. Judging from the concern, I think that we and the city and county should be considering some additional measures regarding that.

Now, as I stated in my testimony, we did review the design of the facility, and we gave our approval. In addition, the effluent from the pond itself is under review at the present time by us, on the basis of the permit issued recently to the ponding operation. In fact, the permit is dated September 13, 1971, which is the date that the ponds were cut in. These permits are specific. They indicate exactly the content of sewage to be introduced into the pond, the strength of the material that we are anticipating -- 85 percent or thereabout treatment efficiency.

They are required to report to us on a regular basis, the results of their analyses of this effluent, and we will be doing studies of our own. If they do not meet these conditions, they will be in violation of our permit. And we will go in and revoke the permit, or ask that they make corrections to bring the operation up to par with the state of conditions of the permit application.

I think the situation is sufficiently covered. It depends a great deal on the attention given to the operation. I'm sure that the city and county will be addressing this question as they undertake the management of this facility.

DR. QUISENBERRY: Thank you, Mr. Soneda.

MR. O'CONNELL: Mr. Soneda, would you then not expect to have odor problems from the ponds, or do you think there is a possibility?

MR. SONEDA: I think that the Chairman mentioned that we're not running a perfume factory in this situation through these ponds, so there's bound to be a smell associated with the handling of sewage. I don't think that we can negate that point, but a well run lagoon or oxidation pond should not have the anaerobic by-products of biological degradation of sewage.

MR. O'CONNELL: With respect to the dump, is there any limitation to the provision that the dump may be used for noncombustibles?

MR. SONEDA: When we said noncombustibles, we were referring to construction debris and that type of thing. And I don't think it is beneficial to the area, for instance, to allow the continuous disposition of the mixture of air pollution and other things that can be ignited intentionally or otherwise.

MR. O'CONNELL: Is there any control placed upon the releasing of the materials out of the dump into West Loch?

MR. SONEDA: No. I think that the dump area is historic. It goes back quite a bit, and I think that certain -- I think there's a certain amount of people that are going to continue to dump into the water. The only alternative here is to take the whole thing out. Obviously, no precautions were taken initially.

MR. O'CONNELL: Thank you.

MR. STEIN: I think that Miss Shimmin and some others have indicated that they considered the dump a significant source of the water pollution as well as a cause of the leeching problem. Now, if we are going to preserve West Loch, and if we're going to improve the condition, this is a thought, even though we cut back some of it somewhat, do you think that the conferees are going to have to make a recommendation for doing something about that dump?

MR. SONEDA: Yes.

MR. STEIN: You have to recognize that we're talking about oysters.

MR. SONEDA: We will continue to make surveillance of the area, obviously in Class AA waters, and if it is found to be necessary, I think we'll need to go in there and, in various parts of some sort, and fill it in.

MR. STEIN: I understand that. We have worked together for years, and I want to make this clear. It seems this procedure is not the anticipated enforcement.

I think that we have tried, as I have in coming up with something more than continuing dumping and surveillance. In other words, I think that something has to be done. I think we are going to have to come up with some specifi plans. We just can't leave this and go on and keep looking at it in surveillance.

that were taken, both through the refuse operation and the sewage discharge. They have ceased the overt action, and both promised to stop and they are under orders to stop doing what they're doing.

MR. STEIN: That's all right, but if we have to have continuing leeching from that dump, it seems to me that we're going to have to put up some barrier to prevent continued pollution.

MR. SONEDA: That's correct.

MR. STEIN: Now let me transfer to another point. As I understood you on the safety factor, you indicated -- and of the statements that we heard this morning, especially carried through from Representative Mink -- that you probably think that it would be appropriate to put in a safety precaution around the lagoon, but you have to deal with the city and the county. Do I understand you correctly on that?

MR. SONEDA: Well what I meant to say is that this is considered a safety-controlled area.

MR. STEIN: I understand that. But you said that in view of the concern the people have that you were ready to take another look at this.

MR. SONEDA: Yes, because there's no question to anybody that has been on this site, the children can get to the site. That's correct, and in view of this statement that the children are getting there, maybe for the protection of themselves, we should take another hard look at it.

MR. STEIN: Well, I ask again, if you were agreeable to this, I don't think that the city and county should have to be taken into consideration when it is a safety factor. I think that the conferees are going to have to grapple with this -- setting a time schedule for this. If the safety of children is involved, we will have to come up with something pretty soon if we're going to do so.

I don't believe we've come to the last 2 points. That is whether the lagoons or ponds have a design that is sufficient to permit proper operation within the resourses that you have within the State of Hawaii, or whether you believe that you might need some assistance.

MR. SONEDA: Well, this is the way that we handle this kind of situation. First of all, in this zone, according to the permit and the rules verifying it, we get weekly and bi-weekly analyses from them. And the present flow has proven to be 100,000 gallons a day, while the design flow is 400,000 gallons a day. When they get between 200,000 and 400,000, why we start sitting on any additional subdivisions. And we try to make corrections to try to depart from this condition; and this is the way it normally goes. We put restraint on the additional flow going into the thing. Now it works with varying degrees of success, depending on the tenacity of the people involved in the sitting operation, but it works to some degree. I think its effectiveness is there.

MR. STEIN: In other words, if I am correct, you believe that you have a capacity of 300,000 gallons. You mentioned in your original statement that if it wasn't satisfactory you would withdraw the permit. Now I'm not sure that withdrawing the permit will accomplish anything here if you have the raw discharge flowing into an unsatisfactory lagoon.

It seems to me, if we're going to meet this, we have to be reasonably assured that those lagoons are designed, at least during the interim period, to handle normal flow, and not to wait until that day is on us; and secondly, that the lagoons are being operated to their optimum effectiveness. Now are we getting at either one or both of them?

MR. SONEDA: The operational aspect I think the city will be talking more about. But under the present permit they report to us that they are going into a course of action of going into the Honouliuli -- that they will be attached to that by 1976, and they hope to increase it to 300,000 gallons as indicated.

But if we withdraw the permit and the other ones that I just mentioned, issue no more subdivision approval on a system that does not have any permit from us, and they have no permit with us, they would have no business to have any further work, and we will stabilize it. In places that are being operated on it, basically we should not have any problems.

MR. STEIN: I understand what you're saying, but unless Hawaii is different from the other States it is nothing. This notion of denying the connection and expecting that things are going to stop and that people are not going to move in and are not going to connect doesn't work in other places.

Now I think that the crucial point is that you have a very small margin. Let me just throw this out for others to comment on. If you have that margin, perhaps we have to get together somehow and come to a reasonable assurance that the design factors of the lagoon are going to be satisfactory for the interim period, or maybe we will have to modify them somewhat. I don't know. I have no conclusion on that.

Secondly, I believe we have to come to the conclusion we are faced with a tight situation, and that we are doing everything we can to be sure that the lagoons are being managed in the optimum manner. Very often, as you well know, lagoons are very crude sewage treatment plants, but it doesn't seem to me that you have very much leeway here. I understand the complaints that we heard this morning. Obviously, there must have been a very good reason for the complaints, because it is something that you can see and smell. I think we're just going to have to address ourselves to the fact that it is a very hard matter to grapple with the lagoon problem.

I would like to say one last thing. Within the limits of the biological treatment, this is one area where we know the techniques and we know what to do. I think we're fortunate in this. If we build in enough safety factors, we can have a lagoon that will work if it's big enough. Thank you.

DR. QUISENBERRY: Thank you, Mr. Soneda.

We will proceed onto Dr. Richard Marland, who is the interim director of the Office of Environmental Control and chairman of the Governor's Task Force on Pearl Harbor.

TONY HODGES: I wish to make an objection.

TONY HODGES

MR. STEIN: All right. Come to the microphone.

MR. HODGES: I am Tony Hodges. I am president of Life of the Land, and I do want to voice my objection to the fact that Dr. Marland will be testifying for the State.

This is an enforcement conference. This conference was called -- the reason for calling this conference was the State, in the estimation of Mr. Ruckelshaus, the State was not doing its job with regard to Pearl Harbor.

I feel that everyone in this room and the public should be interested that Dr. Richard Marland, while he purports to represent the State today, is in fact a paid employee of the Environmental Protection Agency which is the very Agency which has called this conference.

I feel that there is a conflict here which is no fault of Dr. Marland's. I want to point that out. But I do feel that the State of Hawaii cannot adequately be represented by Dr. Marland. And I feel that in fact the future legal stance of the Environmental Protection Agency in this case is endangered by having one of its own paid employees representing a group of the State of Hawaii which soon, we hope we will have engaged in court in a legal proceeding.

I feel that this particular should be made very,

very clear. I want to represent to you that Dr. Marland is representing Governor Burns; and Governor Burns can choose whoever he wishes to represent him. I would hope that, Governor Burns having so chosen you to represent him, that you would have turned him down.

I do not think that we can have this kind of cooperation. It is entirely too close. The Environmental Protection Agency is charged with a larger task than that of the State. The State must enforce the State water quality standards. The Environmental Protection Agency must enforce the standards nationwide.

I feel in this case that you cannot have your employees, even though he has been loaned to the State, to represent fairly our position. I think that in this case, we will be represented too fairly.

I might also mention that the enforcement conference that was called by Mr. Ruckelshaus, was called over the very public objection of Governor Burns. And that it was Governor Burns that Dr. Richard Marland was assigned to serve very, very diligently, to the point where people in the Environmental Protection Agency wondered who he worked for; since Dr. Marland has been instrumental in recommending an incredibly large increase in the deadlines, incredible delay to the deadlines for polluters that polluters must meet. You probably are not aware, but there was a public hearing scheduled for yesterday, which was delayed till next week after you have left town, to amend the water quality standards, the implementation schedule which would be those dates for dischargers to stop dumping into the State waters.

These amendments were going to be made without a public hearing. Fortunately, the Environmental Protection Agency pointed out to Dr. Marland, and they got together and they informed him that they had to hold public hearings.

Dr. Marland was instrumental in seeing that the first zone of mixing was granted about a week and a half ago on August 31. This was granted to Hawaiian Electric to their plant which is in the Honolulu Harbor. Unfortunately, the conference does not cover the Honolulu Harbor, or you would not allow it.

I would like to point out to you, too, that Dr. Marland had apparently approved and granted on the 24th of this month, 2 additional zones of mixing, 1 at the Hawaiian Electric plant at Waiau. The Waiau plant is located at Pearl Harbor, and I feel that this has a direct bearing on these proceedings. Dr. Marland apparently believes that the best practicable treatment means no treatment at all, and this is evidenced by his support of an amendment to the implementation plan including 44 proposed zones of mixing.

I think that you are all well aware of the difference between a permit and a zone of mixing. A zone of mixing essentially does not require the applicant in this case who discharges to do anything additional.

Dr. Marland, as a Federal employee, obviously works for the State; and in this case was one of the people responsible for the engineering in the particular arrangement between Governor Burns and the sugar industry, in which dates for compliance were set that violated the State and Federal law.

In other words, the date by which the sugar companies were told that they had to comply was in some cases several years later than the requirement already set by law.

This is the reason that in about 4 days from now, the Public Health Department, under the direction of Dr. Quisenberry, will be holding hearings to change the implementation schedule.

As far as the Environmental Protection Agency is concerned, it means that you will not be in town for a long time. It took you a long time to be able to come here, and you [illegible].

TONY HODGES

It was the only way that you were able to get in unilaterally into the State, because Governor Burns has already refused two requests by the Government to intervene.

I have two more things. I am objecting because this is an enforcement conference, and Dr. Marland, in this case, does not have a right to come up here and speak, because he's on your payroll. In this case, I feel that he will be more in compliance with the State than he really wishes to.

I feel that if this conference comes up with -- of the many recommendations that this conference will come up with, I hope that one will be that Dr. Marland, and for that matter any other Federal employee and the EPA employees, will not be allowed to serve Governor Burns in a personal situation as the interim director of the Office of Environmental Control.

We've already had 2 such people, Dr. Marland being the second. The first one was Dr. Alvin Meyer who was appointed by the Federal Government; and I think Congresswoman Patsy Mink pointed out very clearly this morning that the primary responsibility for cleaning up lies with the State; and I suggest that perhaps one of the steps that we can take toward that would be to have our own director, and not a Federal employee.

So, please bear in mind as you listen to Dr. Marland that he is one of you, and I might stress too that he perhaps is also one of us. I feel it is a very, very hard thing to put your finger on.

I don't think that he should represent the State. I, as a citizen of this State, say that he cannot represent the State. And I might say that about Governor Burns also, but I won't.

Again, let's keep in mind this is an enforcement conference; you came here because the State has failed to do its job, and that's the only reason that you could get in here. And I personally, along with Congresswoman Patsy Mink and other people in the State, wish that you had been here a long time before. So, I object to Dr. Marland's testimony and the fact that he is testifying for the State. But at the same time, I feel everybody should be able to say what they feel. Thank you.

MR. STEIN: Thank you.

The rule on the request, I think that Dr. Marland was detailed to the State pursuant to Federal law. He got his job legally, and he takes assignments the way I take mine, and we do the job that we are directed to do. I also think that Governor Burns or any other Governor or anyone else, for that matter, can pick the man that he wants to represent them. I think that Mr. Hodges' points will be taken in the sense that they bear on any statement that Dr. Marland will give. Therefore, Dr. Marland certainly will be permitted to have the opportunity to make a statement on behalf of the Governor of the State.

I would like to make it very clear, though -- one thing that will come up again and again -- is that also this is a Federal State, and the State is a conferee. As far as I can see, with the information that we have been given here, the State, as it is in almost all cases, is not responsible for the pollution. It is in a regulatory capacity, just like ourselves. We are here because your pollution problem is similar to the other situations in other parts of the United States, and if we have to proceed against individual polluters, it will not be the State. As a matter of fact, in the next stage of this, if we have to go to the next series of this hearing proceedings, the Federal law provides that the State shall be a member of the hearing board. I think that we must recognize that we are here to abate pollution caused by polluters. We're here working together with the State and Federal regulatory Agencies, and certainly, at this conference stage, we are trying to assist each other as much as we possibly can.

Now, Dr. Marland, I think that you can take the podium if you wish. Thank you very much for your views.

STATEMENT OF

DR. RICHARD MARLAND

INTERIM DIRECTOR OF THE OFFICE OF ENVIRONMENTAL CONTROL

AND

CHAIRMAN OF THE GOVERNOR'S TASK FORCE ON PEARL HARBOR

HONOLULU, HAWAII

DR. MARLAND: Thank you, Mr. Chairman. I am Richard Marland, Interim Director, Office of Environmental Quality Control and Chairman of the Governor's Task Force on Pearl Harbor.

Chairman Stein, Mr. O'Connell, Dr. Quisenberry, I would like to preface my remarks by a comment on the opening remarks of the Chairman who opened this conference this morning, and point out that I am, with the State of Hawaii and the Administrator, in total agreement with those excellent sentiments expressed in your opening comments. I concur completely in that, and I believe that we will accomplish all that we should in this conference.

Now one more point. You asked just before lunch with connection with the -- this was something to the effect that we needed some coordination between the military and the local authorities. I think you will find, if in fact my testimony does not demonstrate that clearly, I think that we have -- I'll be happy to answer any questions on that specifically.

It is my privilege today to present testimony to this conference on behalf of both the Office of Environmental Quality Control and the Governor's Task Force on Pearl Harbor.

First, on behalf of the State of Hawaii and speaking as Interim Director of the Office of Environmental Quality Control, I want to establish clearly in your minds and in the record of this conference that we do not consider this to be an adversary proceeding -- even in the slightest degree. On the contrary, we support the spirit of this conference as a joint Federal-State review of environmental problems in Pearl Harbor. We know that Pearl Harbor is polluted, and we are as anxious as EPA, perhaps more so, to get it cleaned up. We also view this conference as an excellent opportunity to gain concurrence between the State and Federal Governments as to their respective responsibilities and commitments on the steps necessary to abate pollution in Pearl Harbor and restore that environment to its greatest possible usefulness to all people.

157-a

DR. RICHARD MARLAND

Governor Burns assigned the responsibility for developing a total plan for Pearl Harbor to the Governor's Task Force on Pearl Harbor which he formed on June 25, 1971. I submit for the record the following documents:

A. List of members of Governor's Task Force on Pearl Harbor; and,

B. Charge to the Pearl Harbor Task Force by Governor John A. Burns, dated July 19, 1971.

(The above-mentioned documents follow.)

GOVERNOR'S TASK FORCE
ON
PEARL HARBOR

Members

Mr. C. J. Cavanagh - President, Chamber of Commerce of Honolulu
Col. William D. Falck - Deputy Div. Engineer, Corps of Engineers
Col. Donald D. Gabe - Director of Engineering, USA
Dr. David Golding - Dole Corporation
Admiral Thomas B. Hayward - Commandant, 14th Naval District
Mr. Lou Herschler - Oahu Sugar
Dr. Richard E. Marland - Interim Director, OEQC
Mr. Hideo Okada - Wai Lani Inn
Mr. Shizuo Onishi -Aiea
Captain Lewis G. Timberlake -District Civil Engineer, USN
Mr. Albert Zane - Director and Chief Engineer, C&C Dept. of Public Works

Ex-officio Members

Dr. Doak C. Cox - Director, U. H. Environmental Center
Mr. L. Russell Freeman - Director, EPA Water Quality Office

Liaison Members

Dr. Melvin Dollar - Department of Agriculture
Mr. Shinji Soneda - Department of Health

Staff Members

Mr. Bob Furin - U. H. Environmental Center
Mrs. W. D. (Patty) Madden - OEQC
Mr. Rick Scudder - U. H. Environmental Center

EXECUTIVE CHAMBERS
HONOLULU

July 19, 1971

A. BURNS
VERNOR

Charge to the Pearl Harbor Task Force

You have been invited to serve your State, and, indeed, your Nation by helping Hawaii solve a difficult and challenging problem. Service to the people is a professional quality which each of you possess in a full measure. It is that quality, among others, which prompts me to choose you for this task. Of course, each of you also brings to this Task Force a unique quality which is needed to identify the best technical procedures for the restoration of Pearl Harbor. Each of you is also in a position to create policy and commit resources, and these talents are critical to our success. But, that feature which is most important in establishing the basis for our actions is service to people. The goal, therefore, which I set for this Task Force is to create, in and around Pearl Harbor, an environment which provides the greatest possible benefits to all people.

Pollution of the waters, air and land is inconsistent with such an environment. Ugliness and profuse noise are also detrimental. Elimination of these problems is your first challenge. Those constructive measures by which you will prevent new abuses to that area are a needed second phase. Your own ideas and sense of public service will be challenged to present to us your eventual recommendation for the final, and most important actions: What uses of that beautiful environment will best serve the needs of the people of Hawaii, the Nation, and the World?

I place no demands upon you to arrive at any foregone conclusion. I seek only those results which are possible and which fulfill the goal of this Task Force. I do remind you that the need for prompt actions and effective solutions is great. You must strive to reach your goals in the shortest possible time. The clear expression of public interest calls for you to work fast to prevent further degradation and accomplish improvements. In applying yourselves to these responsibilities, however, do not accept solutions which are not sound or effective in the name of speed. Your work must reflect your best professional judgements of good quality.

You should look on your participation in this Task Force--not as an avenue to solving a problem--but as an opportunity. An opportunity to apply your utmost talents to the creation of a living testimony to all people that man can indeed live, work and play in harmony with his environment.

Borrowing the words from Admiral Hayward, I charge this Task Force with the responsibility of transforming Pearl Harbor into a model environment. A model for all Hawaii, all the Nation and all the World.

Thank you for offering your services in this task. The difficulty and importance of your work are equally great. I pledge my support to your efforts, and as their Governor the support of all our people.

John A. Burns

This move was made to consolidate into a single effort the various Federal, State and local Government Agencies' responsibilities for pollution control, and in light of Admiral Hayward's stated intention to "make Pearl Harbor a model place of beauty that can be enjoyed by all, with parks, marinas and other leisure time facilities bordering its shorelines." The goal set for this Task Force was -- "to create, in and around Pearl Harbor, an environment which provides the greatest benefits to all people." This Task Force obviously has the responsibility of identifying the sources of pollution in Pearl Harbor, and recommending the means by which pollution will be controlled within the authorities of the Federal, State and local Government Agencies concerned. This objective is broader, though not less intensive, than the purposes of this Federal-State conference. The Pearl Harbor Task Force has the added responsibilities of dealing with air pollution, solid waste problems and other environmental aspects in addition to water pollution as it affects the oyster beds of West Loch. Further, the Task Force is charged with developing those recommended steps which can assure that once pollution sources in Pearl Harbor are controlled, that a system of environmental management be applied to assure the continued protection of that area. Finally, the Task Force will recommend those environmental improvement steps which will fully utilize the unique qualities of Pearl Harbor and both perpetuate its shrine-like nature and provide a place of recreation and enjoyment for all people.

The testimony you have received and will receive later from various State people will show clearly that Hawaii is dedicated to the cleanup of Pearl Harbor. We are committed to provide the resources needed in amounts and on a schedule to do the job as quickly as possible. Through this conference we will establish that the EPA can fulfill its legal and moral commitment to Hawaii by matching our commitment in a cooperative and timely manner.

We urge that the EPA join with Hawaii to set the goal of this conference as seeking the best and quickest means by which Pearl Harbor can be developed into an environmental model -- indeed an environmental pearl -- for the fullest possible enjoyment by all people. No lesser goal is worthy of this most famous of all American shrines. The testimony you will hear will show clearly that the people of Hawaii -- State and local offices, industry leaders, military commands, citizen groups, and concerned individuals -- have moved quickly and objectively to attain the goal established by Governor Burns. Hawaii is pledged to the accomplishment of this goal.

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DR. RICHARD MARLAND

To reach this goal, we seek both the guidance and financial support from EPA and the other Federal Agencies whose skills and resources can be applied. We hope this conference will establish clearly the nature and amount of support which is needed from local, State and Federal sources and, most important, we hope that EPA will join with Hawaii in making a firm commitment to meet its legal obligations to provide this assistance in a timely and effective manner. The very nature of Pearl Harbor is that, although located in Hawaii, and of immense potential value to the people of Hawaii, it also is a shrine for all Americans, and no more fitting place exists for the United States to demonstrate to all the world that we can create a model environment, even improving upon Nature, and that we can dedicate that model to the cause of peace among nations and for the enjoyment of all people.

The responsibility for developing and carrying out Hawaii's program for Pearl Harbor has been assigned to the Governor's Task Force on Pearl Harbor. I would like now to describe some of the accomplishments of that Task Force. I will do so in a summary manner, submitting documentation for the record as appropriate in the interest of brevity.

In the first place, the operations of the Task

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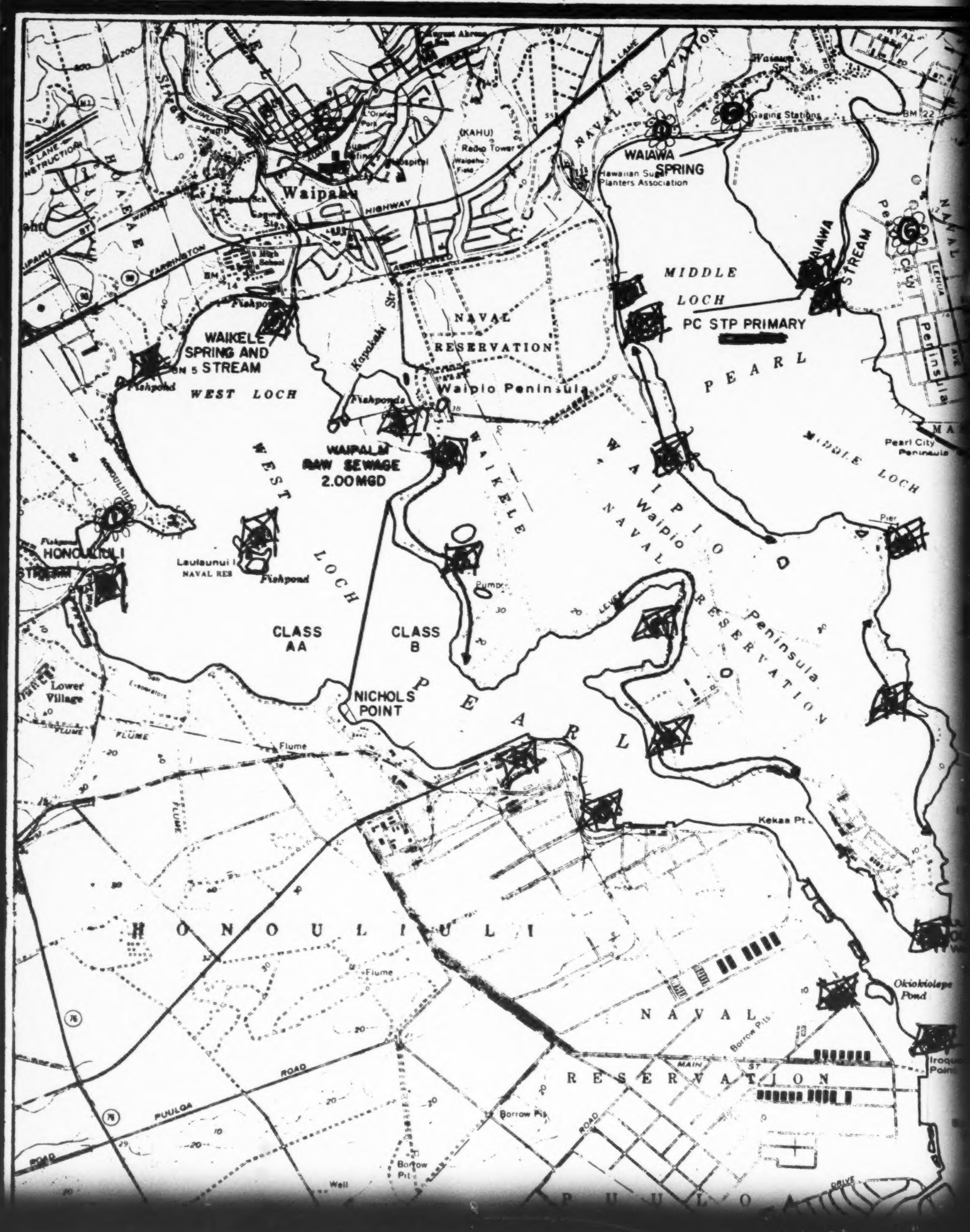
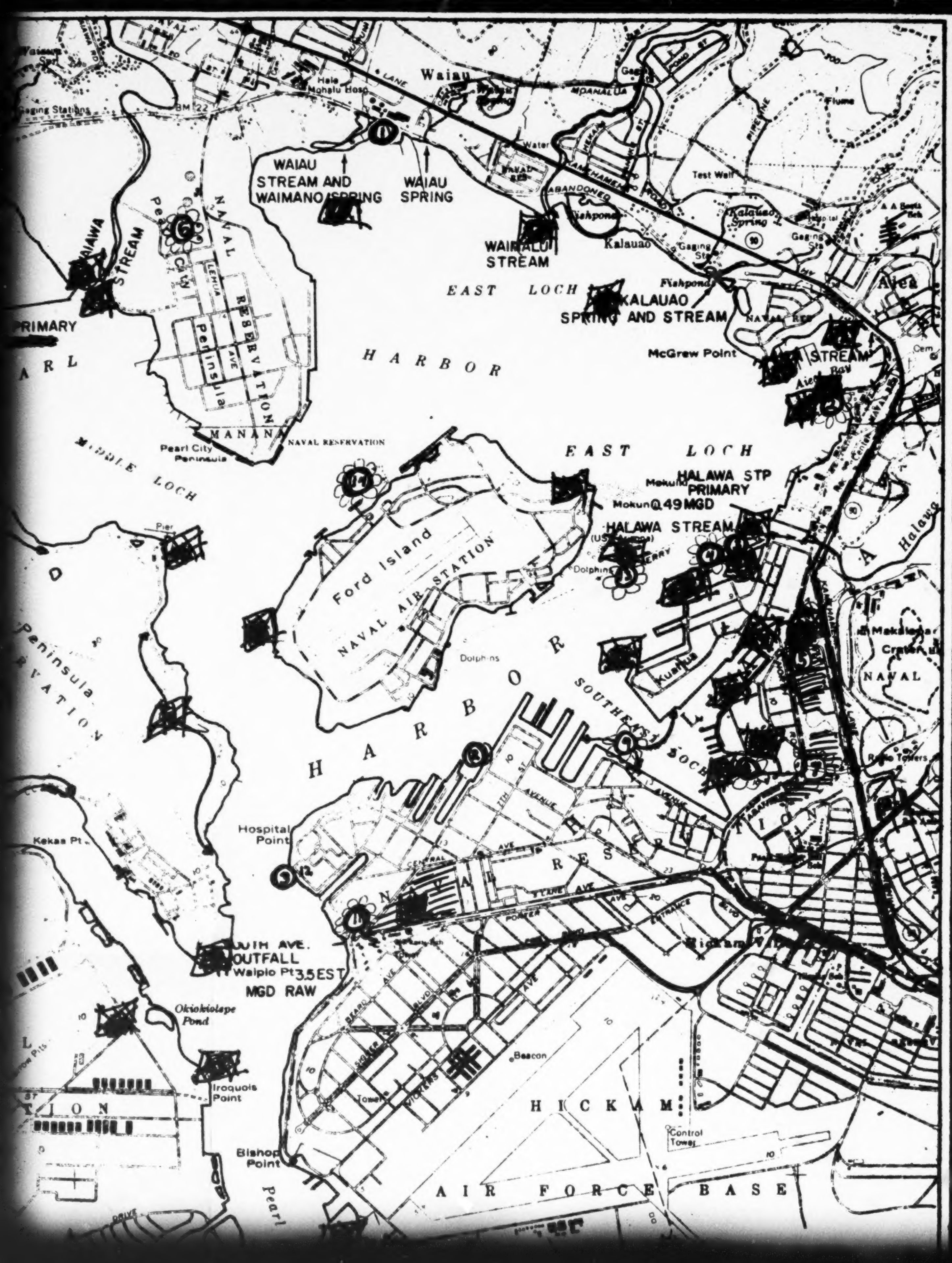
Force and its weekly meetings have from the beginning been open. The media have attended each meeting and, except for yesterday's regular meeting, no restrictions have been placed upon their use of material. Yesterday's meeting consisted of review of this testimony which for obvious reasons could not be released until today.

The first action of the Task Force was to review the Navy's newly developed Pearl Harbor Pollution Model Study. That study reported the existence of more than 80 point sources of pollution of all kinds, both military and civilian, including visual pollution. These were quickly recognized by the Task Force as an incomplete list. Through the assistance of the Department of Health and the Department of Agriculture, the list was extended to include all identifiable sources of pollution in the Pearl Harbor Basin. I submit for the record of this conference the following excerpts from the manual of the Pearl Harbor Task Force: Maps I, II, and III of Pearl Harbor area and 8 pages of keys to these maps which identify and explain each pollution source. (The above-mentioned maps and keys follow.)



Waipahu
HIGHWAY
FARRINGTON
(KAHU) Radio Tower
Hawaiian Sugar Planters Association
NAVAL RESERVATION
WAIAWA SPRING
Gaging Stations
WAIAWA STREAM
MIDDLE LOCH
PC STP PRIMARY
[redacted]
PEARL
Pearl City Peninsula
MIDDLE LOCH
NAVAL RESERVATION
Waipio Peninsula
WAIKELE SPRING AND STREAM
Fishpond
WEST LOCH
WAIPAHU RAW SEWAGE 2.00 MGD
WEST LOCH
WAIKELE
WAIPIO
Waipio Peninsula
NAVAL RESERVATION
HONOULIULI STREAM
Laulaunui I NAVAL RES
Fishpond
Pump
CLASS AA
CLASS B
NICHOLS POINT
PEARL
Lower Village
FLUME
Flume
Kekaa Pt
HONOULIULI
NAVAL
Borrow Pits
MAIN ST
RESERVATION
Okiokiolepe Pond
Iroquois Point
PUULOA ROAD
Borrow Pit
Well
PUULOA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Hale Moanalua Hosp
Gaging Stations
BM 22
MOANALUA
Flume
Water
KAMEHAMEHA HIGHWAY
ABANDONED
Fishponds
Test Well
Kalauao Spring
Kalauao
Gaging Sta
WAIAU STREAM AND WAIMANO SPRING
WAIAU SPRING
WAIMALU STREAM
WAIAWA STREAM
PRIMARY
EAST LOCH
KALAUAO SPRING AND STREAM
Fishponds
NAVAL RES
Aiea
McGrew Point
STREAM
Aiea Bay
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HARBOR
Pearl City
Peninsula
LEHUA AVE
NAVAL RESERVATION
MANANA
NAVAL RESERVATION
Pearl City Peninsula
MIDDLE LOCH
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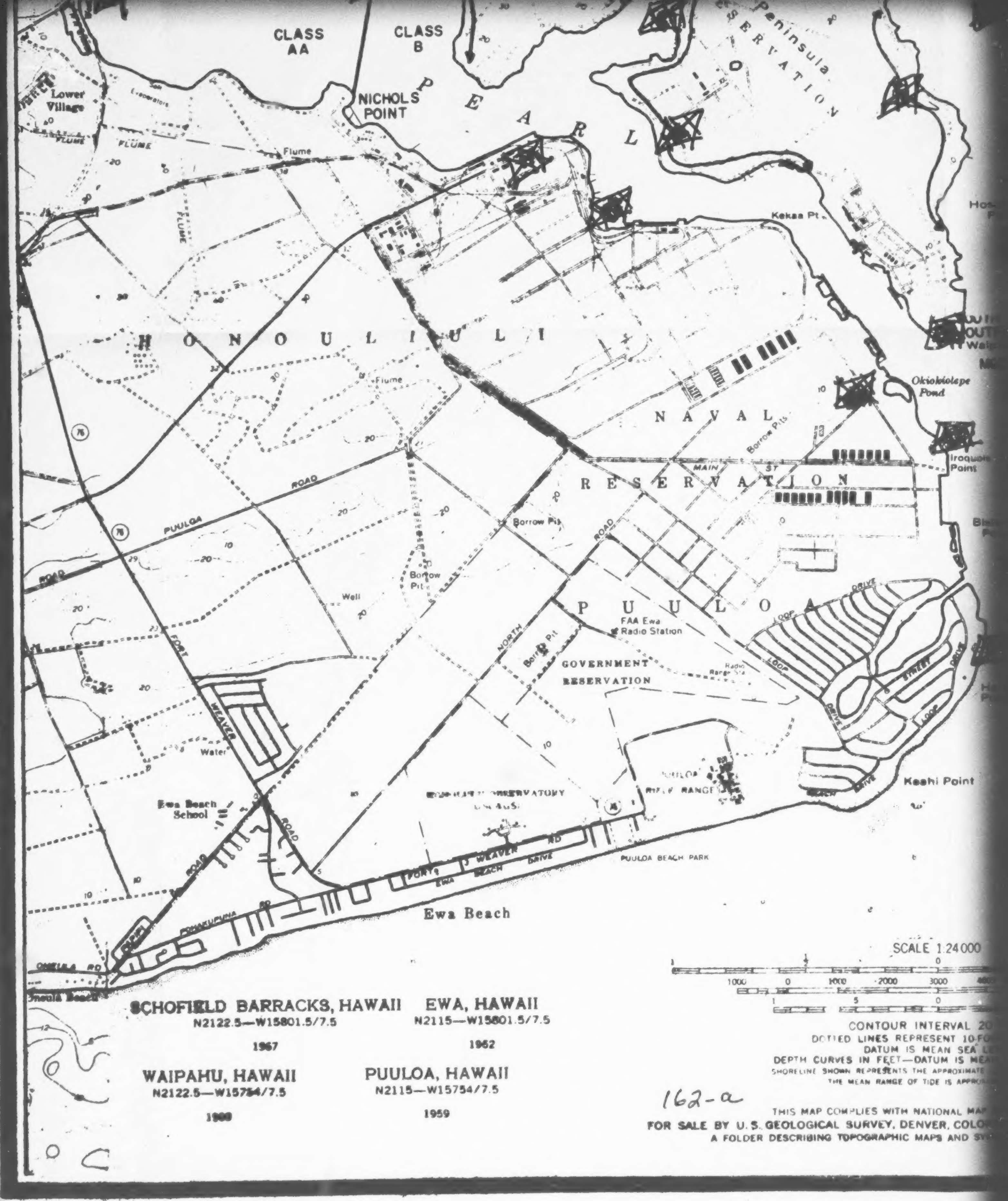
HALAWA STP PRIMARY
0.49 MGD
HALAWA STREAM
Dolphins
Pier
Ford Island
NAVAL AIR STATION
Dolphins
Halawa
Makalapa Crater
NAVAL
Peninsula
RESERVATION
HARBOR
SOUTHEAST LOCH
Kuahua
Radio Towers
Kekaa Pt
Hospital Point
CENTRAL AVE
NAVAL RESERVATION
STANE AVE
10TH AVE. OUTFALL
Waipio Pt
3.5 EST MGD RAW
Okiokiolepe Pond
Beacon
Iroquois Point
Tower
HICKAM
Control Tower
Bishop Point
Pearl
AIR FORCE BASE
TION
Hickam


CLASS AA
CLASS B
NICHOLS POINT
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RESERVATION
Lower Village
Evaporators
FLUME
Flume
Kekaa Pt
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NAVAL
RESERVATION
MAIN ST
Borrow Pits
Okiokiolepe Pond
Iroquois Point
Borrow Pit
Well
PUULOA
ROAD
PUULOA ROAD
FORT WEAVER ROAD
NORTH ROAD
FAA Ewa Radio Station
GOVERNMENT RESERVATION
Radio Range Sta
LOOP DRIVE
STREET
Keahi Point
Water
Ewa Beach School
MAGNETIC OBSERVATORY U.S.C.&G.S.
PUULOA RIFLE RANGE
PUULOA BEACH PARK
EWA BEACH DRIVE
POHAKUPUNA RD
ONEULA RD
Oneula Beach
Ewa Beach
SCHOFIELD BARRACKS, HAWAII
N2122.5—W15801.5/7.5
1967
EWA, HAWAII
N2115—W15801.5/7.5
1962
WAIPAHU, HAWAII
N2122.5—W15754/7.5
1968
PUULOA, HAWAII
N2115—W15754/7.5
1959
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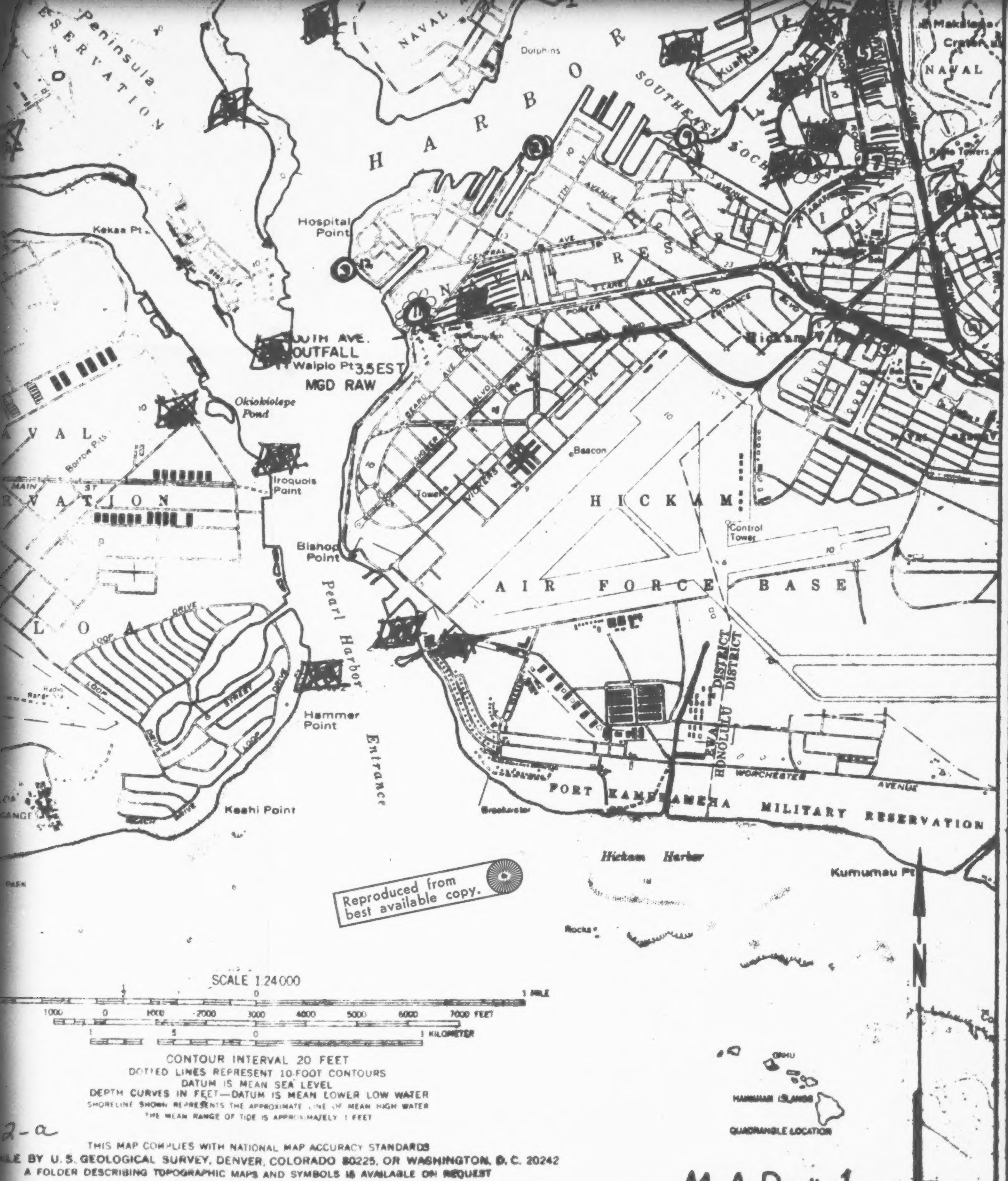
162-a

PLATE I PEARL HARBO


Peninsula
RESERVATION
NAVAL
HARBOR
Dolphins
SOUTHEAST LOCH
Kuahua
Makalapa Crater
NAVAL
Radio Towers
Hospital Point
Kekaa Pt
CENTRAL AVE
7TH AVENUE
NAVAL RESERVATION
POWER AVE
ENTRANCE
Hickam
10TH AVE. OUTFALL
Waipio Pt 3.5 EST MGD RAW
Okiokiolepe Pond
NAVAL
Borrow Pits
MAIN ST
RESERVATION
Iroquois Point
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HICKAM
Tower
Control Tower
Bishop Point
AIR FORCE BASE
Pearl Harbor
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Radio Range Sta
Hammer Point
Entrance
EWA DISTRICT
HONOLULU DISTRICT
WORCHESTER AVENUE
Keahi Point
Breakwater
FORT KAMEHAMEHA MILITARY RESERVATION
Hickam Harbor
Kumumau Pt
Rocks
N
OAHU
HAWAIIAN ISLANDS
QUADRANGLE LOCATION
SCALE 1:24 000
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
MAP #1
2-a

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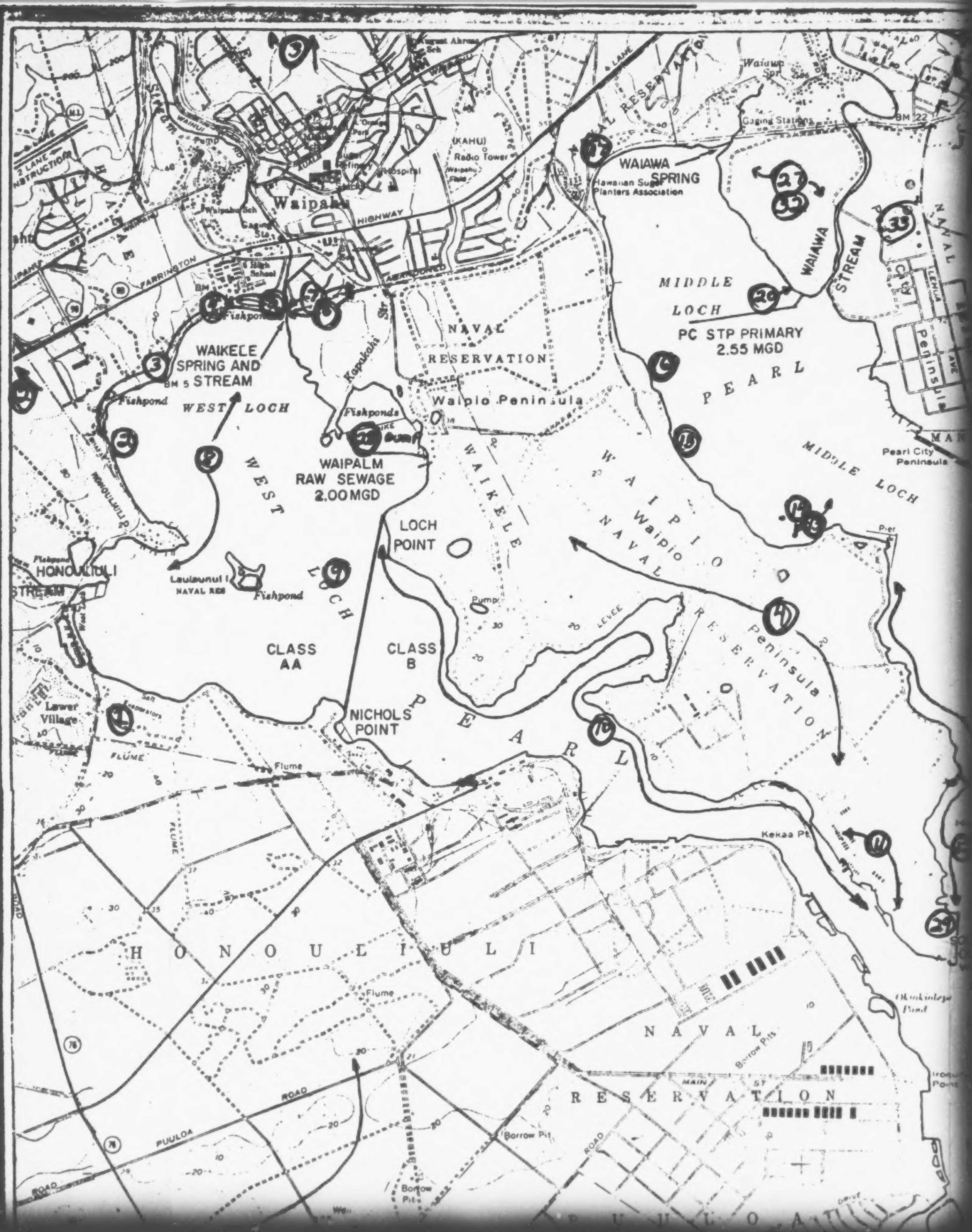
CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 1 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
ALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D.C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

PLATE I PEARL HARBOR

Water, Oil, Misc. Pollution
▨ ◎ ○ Review Check


Waipahu
HIGHWAY
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High School
Fishpond
WAIKELE SPRING AND STREAM
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WEST LOCH
WEST LOCH
Kapakahi Str.
Fishponds
WAIPALM RAW SEWAGE 2.00 MGD
Laulaunui I. NAVAL RES
Fishpond
HONOULIULI STREAM
CLASS AA
CLASS B
LOCH POINT
NICHOLS POINT
Lower Village
FLUME
Flume
NAVAL RESERVATION
Waipio Peninsula
WAIKELE
WAIPIO
Waipio NAVAL RESERVATION
Waipio Peninsula
LEVEE
Pump
(KAHU) Radio Tower
Hospital
Sugar Refinery
NAVAL RESERVATION
WAIAWA SPRING
Hawaiian Sugar Planters Association
Waiawa Spr.
Gaging Stations
BM 22
WAIAWA
STREAM
MIDDLE LOCH
PC STP PRIMARY 2.55 MGD
PEARL
Pearl City Peninsula
MIDDLE LOCH
Pier
Kekaa Pt
PEARL
HONOULIULI
Flume
Borrow Pits
NAVAL RESERVATION
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PUULOA ROAD
Borrow Pit
Borrow Pits
Okiokilepe Pond
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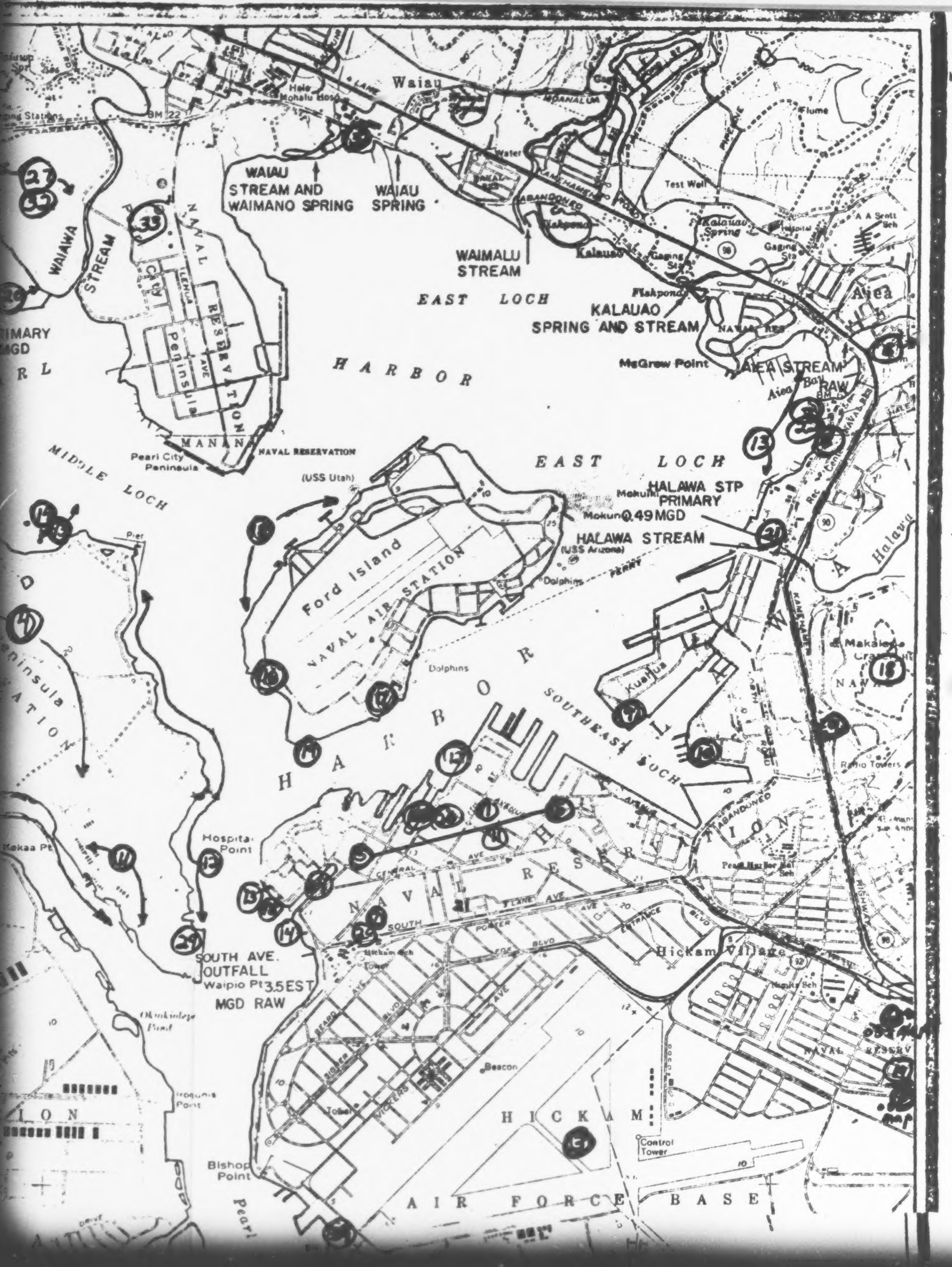
Waiau
Hale Mohalu Hosp
WAIAU STREAM AND WAIMANO SPRING
WAIAU SPRING
Flume
Test Well
WAIMALU STREAM
Kalauao Spring
Kalauao
Fishpond
Gaging Sta
A A Scott Sch
Aiea
EAST LOCH
KALAUAO SPRING AND STREAM
McGrew Point
AIEA STREAM RAW
Aiea Bay
HARBOR
NAVAL RESERVATION
Pearl City Peninsula
PRIMARY MGD
WAIAWA STREAM
MIDDLE LOCH
(USS Utah)
EAST LOCH
Mokumi
HALAWA STP PRIMARY 0.49 MGD
HALAWA STREAM
(USS Arizona)
Dolphins
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Ford Island
NAVAL AIR STATION
Halawa
Makalapa Crater
Kuahua
SOUTHEAST LOCH
HARBOR
Radio Towers
Hospital Point
Mokaa Pt
ABANDONED
Pearl Harbor Sch
NAVAL RESERVATION
CENTRAL AVE
LANE AVE
SOUTH AVE
PORTER AVE
ENTRANCE BLVD
Hickam Village
SOUTH AVE. OUTFALL
Waipio Pt 3.5 EST MGD RAW
Okiokiolepe Pond
Beacon
Iroquois Point
HICKAM
Control Tower
Bishop Point
AIR FORCE BASE
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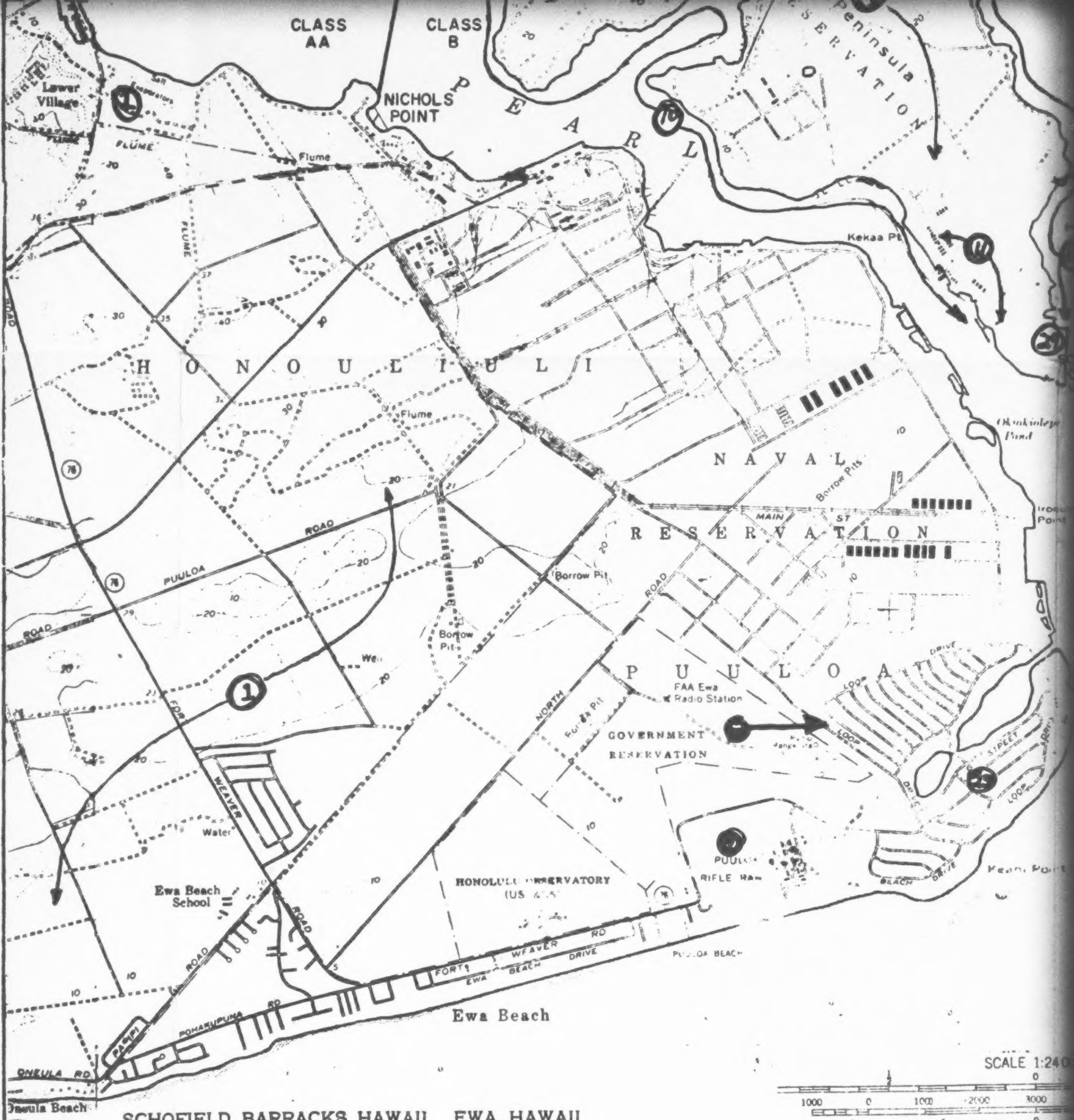
CLASS AA
CLASS B
NICHOLS POINT
PEARL
Peninsula
RESERVATION
Lower Village
PLUME
Flume
FLUME
Kekaa Pt
HONOULIULI
NAVAL
RESERVATION
MAIN ST
Borrow Pits
Okiokiolepe Pond
Iroquois Point
ROAD
PUULOA
ROAD
Borrow Pit
Borrow Pits
Well
PUULOA
FAA Ewa Radio Station
GOVERNMENT RESERVATION
NORTH
Borrow Pit
LOOP
DRIVE
STREET
Puuloa Range Station
WEAVER
Water
Ewa Beach School
HONOLULU OBSERVATORY (US C&GS)
PUULOA RIFLE RANGE
Pearl Point
BEACH DRIVE
FORT WEAVER RD
EWA BEACH DRIVE
PUULOA BEACH
ROAD
POHAKUPUNA RD
Ewa Beach
ONEULA RD
Oneula Beach
1
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11
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76

SCHOFIELD BARRACKS, HAWAII
N2122.5—W15801.5/7.5

1967

EWA, HAWAII
N2115—W15801.5/7.5

1962

WAIPAHU, HAWAII
N2122.5—W15754/7.5

1959

PUULOA, HAWAII
N2115—W15754/7.5

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162-B

SCALE 1:24

CONTOUR INTERVA
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DATUM IS MEAN S
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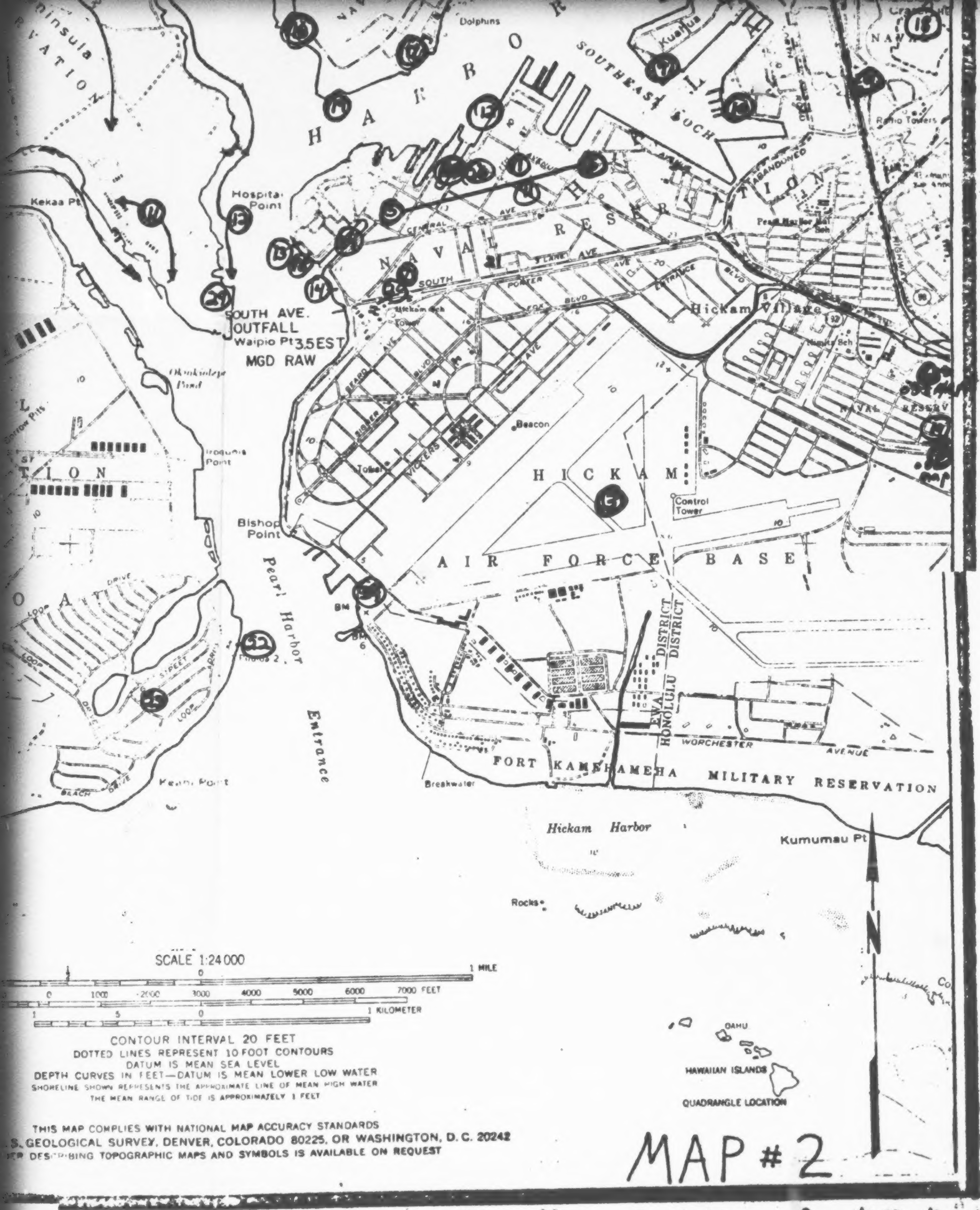
PLATE I PEARL HAR


HARBOR
SOUTHEAST LOCH
Dolphins
Kuahua
NAVAL RESERVATION
ABANDONED
Pearl Harbor Nav Sch
Radio Towers
Peninsula
RESERVATION
Kekaa Pt
Hospital Point
SOUTH AVE. OUTFALL
Waipio Pt 3.5 EST MGD RAW
CENTRAL AVE
SOUTH AVE
PORTER
ENTRANCE BLVD
Hickam Village
Hickam Sch
Beacon
Tower
VICKERS
HICKAM
Control Tower
AIR FORCE BASE
Iroquois Point
Bishop Point
Pearl Harbor
Entrance
EWA DISTRICT
HONOLULU DISTRICT
WORCHESTER AVENUE
FORT KAMEHAMEHA MILITARY RESERVATION
Breakwater
Keahi Point
BEACH DRIVE
LOOP
Hickam Harbor
Rocks
Kumumau Pt
N
OAHU
HAWAIIAN ISLANDS
QUADRANGLE LOCATION

SCALE 1:24 000

1 MILE

0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

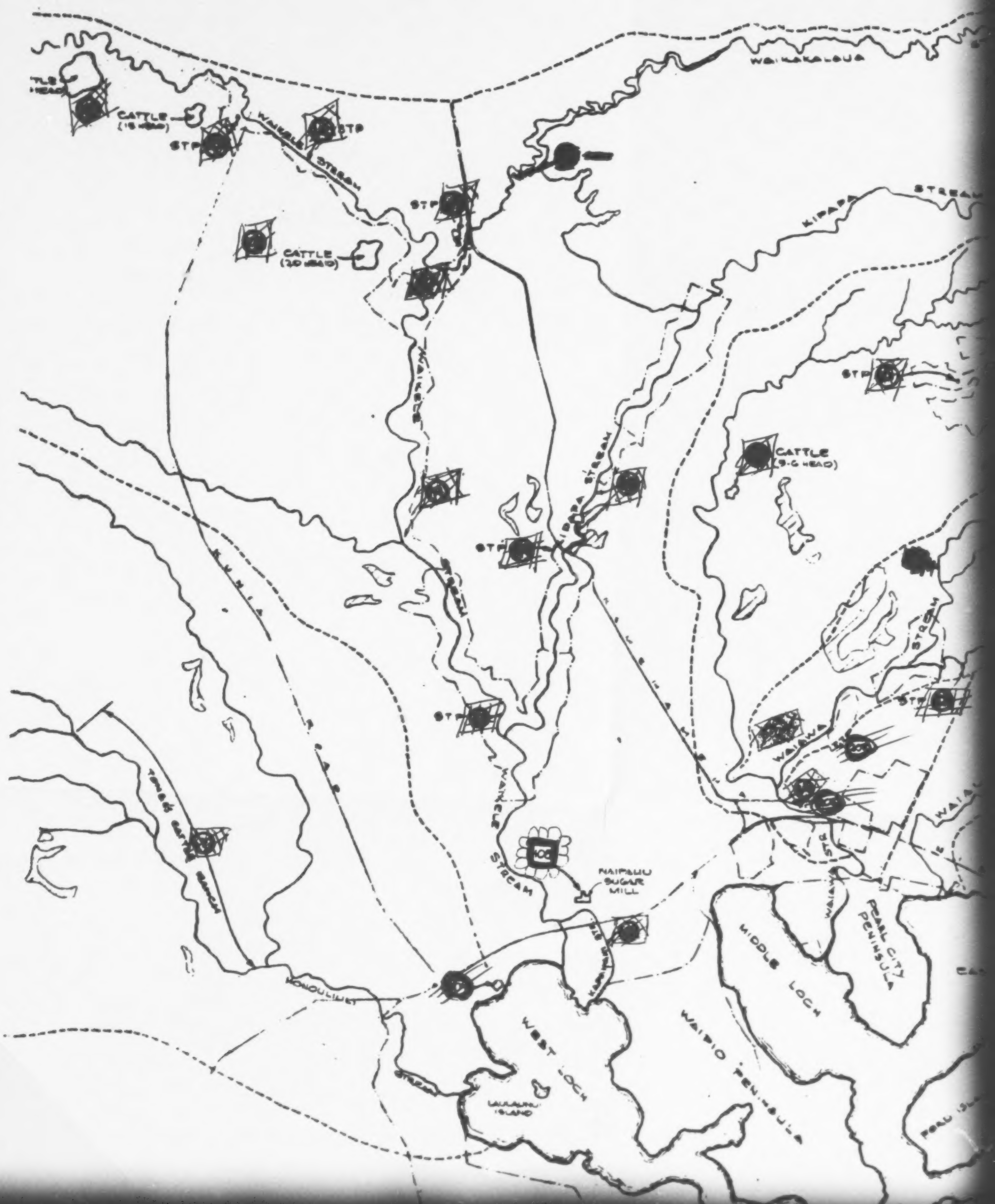
CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOWER LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 1 FEET

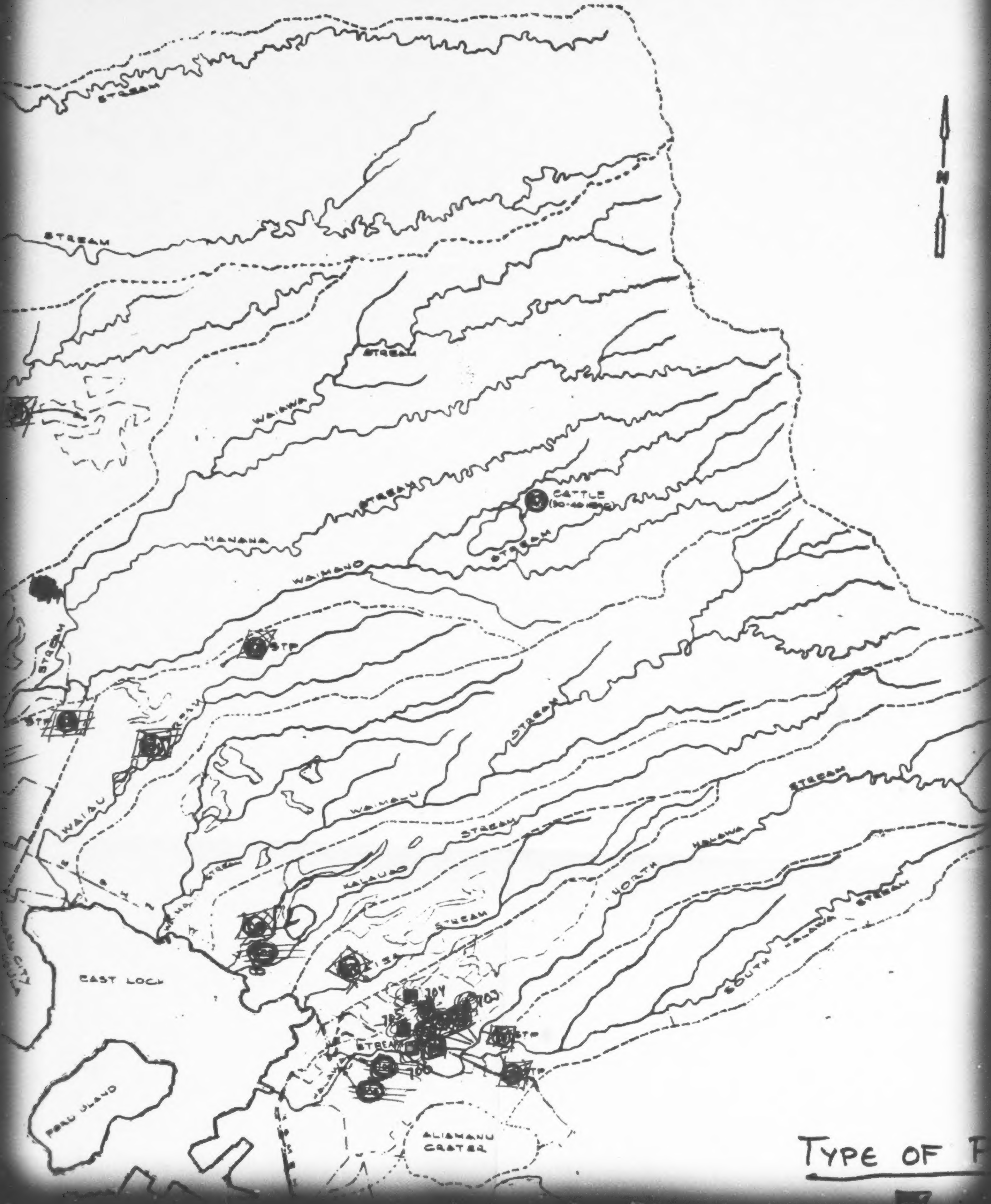
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR WASHINGTON, D. C. 20242
ER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

MAP # 2

Air, Noise Pollution, Beautification

E I PEARL HARBOR


TLE
HEAD
CATTLE
(15 HEAD)
STP
WAIKELE STREAM
STP
WAIKAKALAUA
STP
CATTLE
(20 HEAD)
KIPAPA STREAM
STP
CATTLE
(9-6 HEAD)
KIPAPA STREAM
STP
WAIKELE STREAM
STREAM
STP
STP
WAIAWA
WAIKELE
STREAM
WAIPAHU
SUGAR
MILL
HONOULIULI
KAHUA STR
WEST LOCH
LAULAUNUI
ISLAND
WAIPIO PENINSULA
MIDDLE LOCH
PEARL CITY
PENINSULA
FORD ISLA
STREAM
CA


STREAM
STREAM
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WAIAWA
STREAM
CATTLE (30-40 HEAD)
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STREAM
WAIMANO
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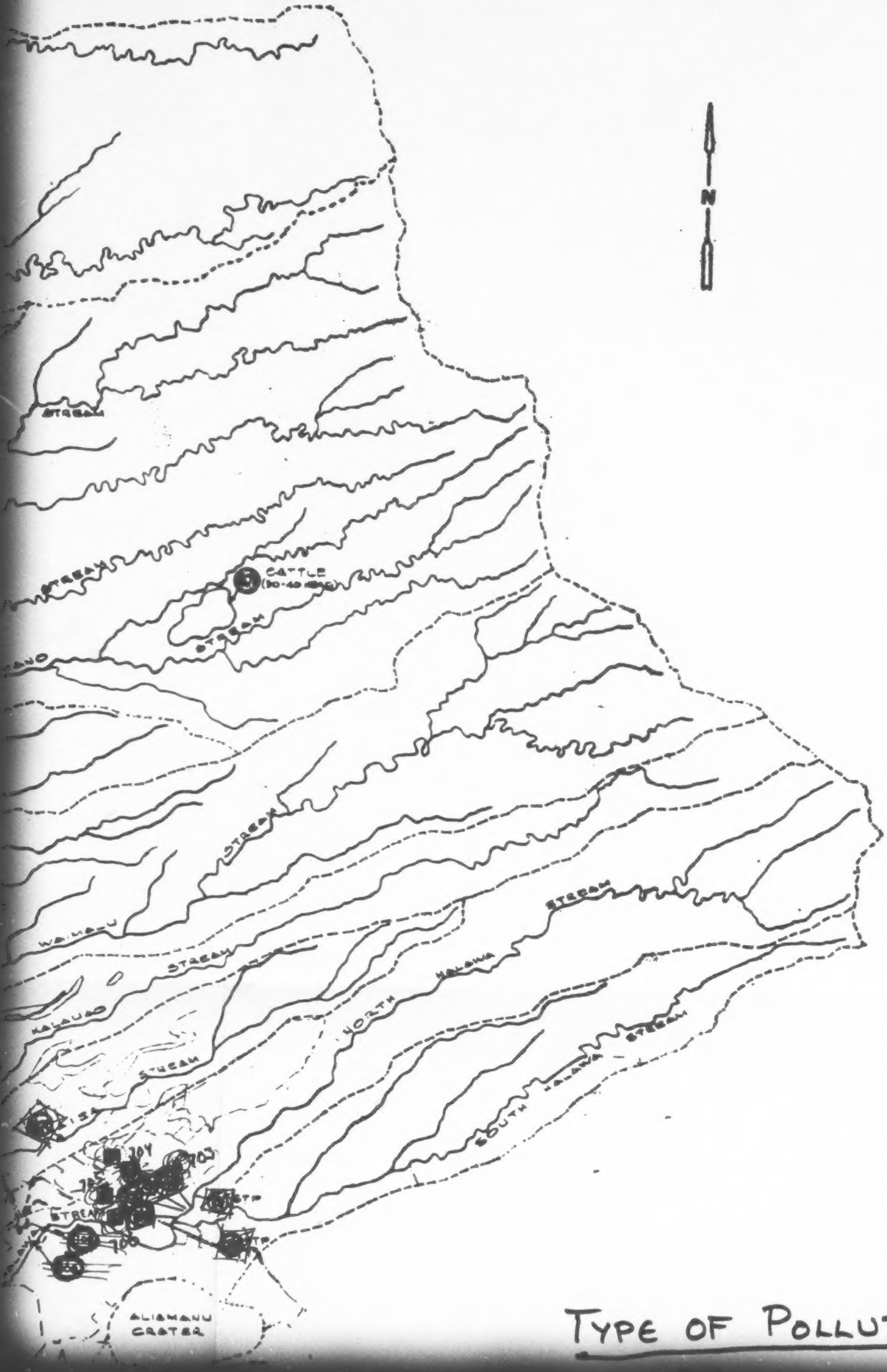
WAIAU
WAIMALU
STREAM
STREAM
STREAM
KALAUAO
STREAM
NORTH
HALAWA
SOUTH HALAWA STREAM
PEARL CITY PENINSULA
EAST LOCH
704
703
STP
STREAM
700
STP
FORD ISLAND
ALIAMANU CRATER

TYPE OF P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STREAM
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(30-40 HEAD)
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WAIMALU
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NORTH HALAWA
STREAM
KALAUAO
STREAM
SOUTH HALAWA STREAM
13
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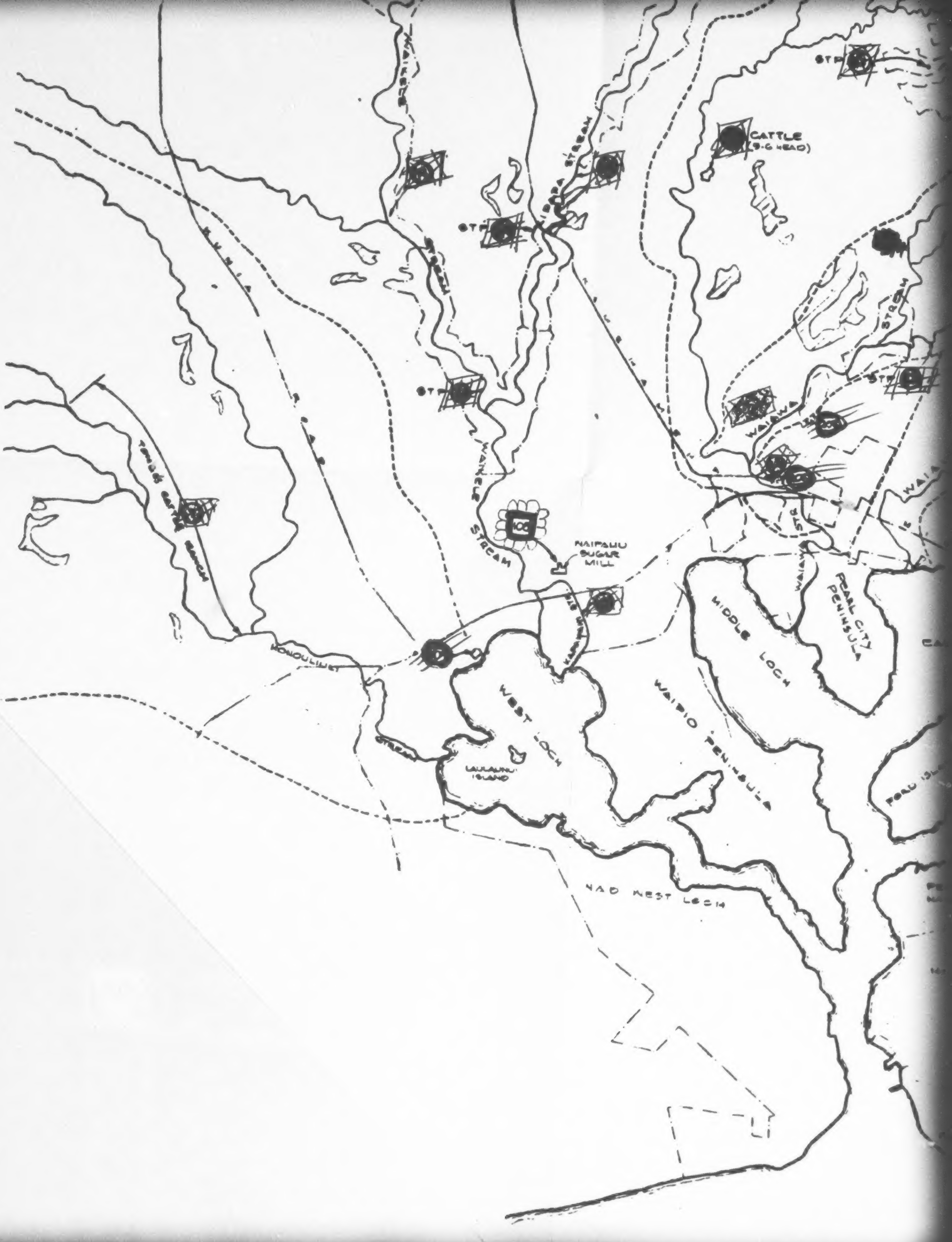
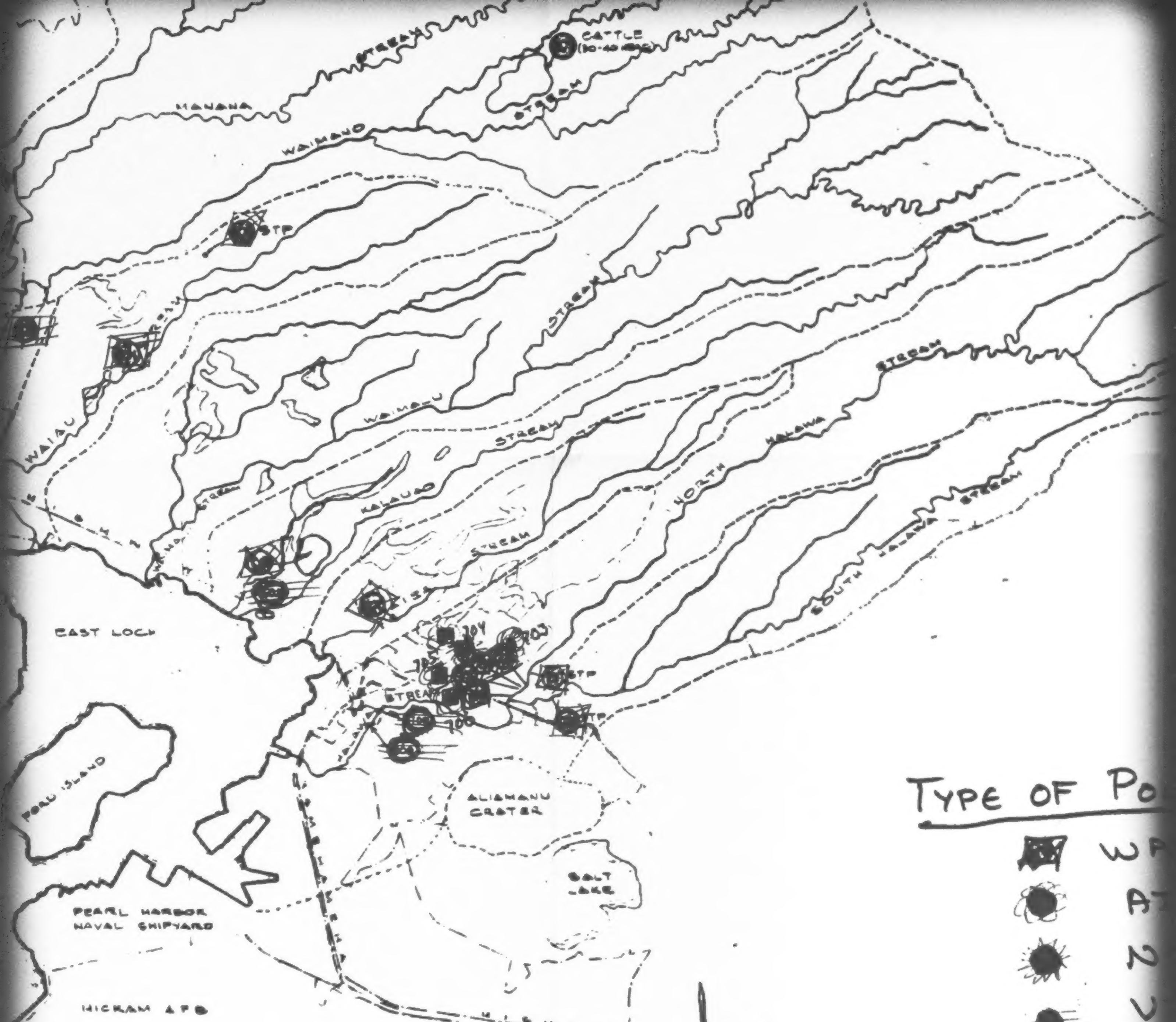
STREAM
STP
STP
700
ALIAMANU
CRATER

TYPE OF POLLUTION


STP
CATTLE (5-6 HEAD)
KIPAPA STREAM
STP
STREAM
STP
STREAM
KUNIA ROAD
WAIAWA
STP
WAIKELE STREAM
100
NAIPAHU SUGAR MILL
WAIAWA
PEARL CITY PENINSULA
MIDDLE LOCH
HONOULIULI
STREAM
WEST LOCH
LAULAUNUI ISLAND
WAIPIO PENINSULA
NAD WEST LOCH
FORD ISL


CATTLE (30-40 HEAD)
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WAIAU
STREAM
WAIMALU
STREAM
KALAUAO
STREAM
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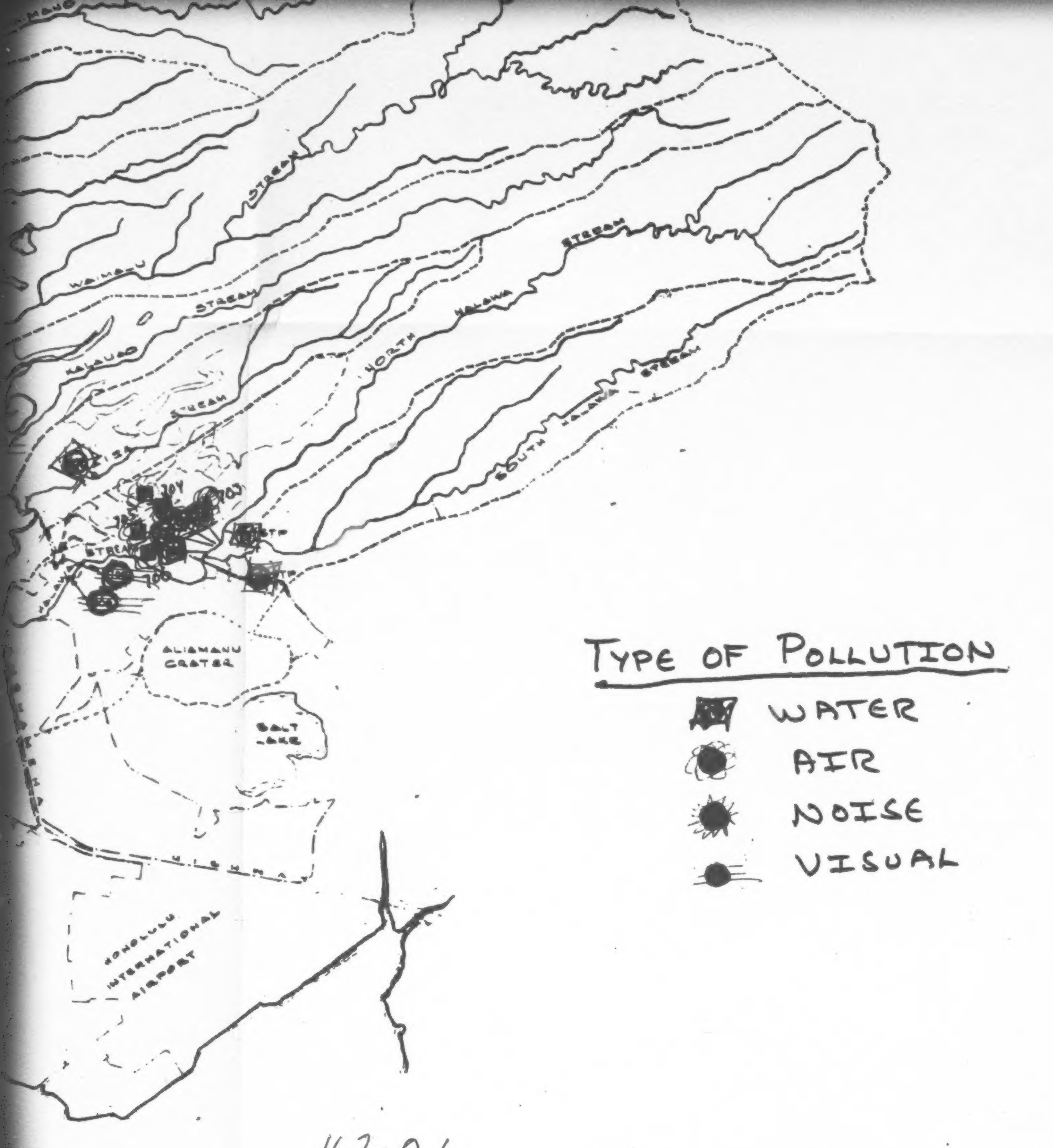
STREAM
NORTH HALAWA
STREAM
SOUTH HALAWA STREAM
EAST LOCH
704
703
700
STP
STP
FORD ISLAND
ALIAMANU CRATER
SALT LAKE
PEARL HARBOR NAVAL SHIPYARD
HICKAM AFB
HIGHWAY
HONOLULU INTERNATIONAL AIRPORT
FORT KAMEHAMEHA
TYPE OF PO
WA
AT
N
V

162-C

MAP #3


STREAM
WAIMALU
STREAM
KALAUAO
STREAM
STREAM
NORTH HALAWA
STREAM
SOUTH HALAWA
STREAM
704
703
700
STREAM
STP
STP
ALIAMANU CRATER
SALT LAKE
HONOLULU INTERNATIONAL AIRPORT
TYPE OF POLLUTION
WATER
AIR
NOISE
VISUAL
GRAPHIC SCALE

162-C

MAP #3

(111)

MAPS OF PEARL HARBOR AREA*
AND
KEYS TO MAPS LISTING POLLUTION SOURCES

The enclosed three maps present the significant sources of pollution as found by the Pearl Harbor Pollution Model Study.

Map number one presents the source location of water, oil and miscellaneous pollution within the Pearl Harbor vicinity.

Map number two presents the source location of air and noise pollution and beautification (visual pollution) within the Pearl Harbor area.

Map number three presents the source location of water, air, noise pollution, natural erosion, and beautification in the Pearl Harbor Drainage Basin area. This map is copied directly from the Pearl Harbor Pollution Model Study Report.

On each map there is a color-coded number representing the location of the pollution source listed. Only the pollution sources listed on appendix maps a and b of the Pearl Harbor Pollution Model Study are shown here on maps one, two, or three. Pollution sources listed on appendix map c of this study, including locations of numerous sewage outfalls, are not listed on the enclosed maps 1-3 due to the required updating of this information. As other pollution sources are identified the location will be plotted on the maps.

Following this are the keys for the three maps.

MAP #1 SOURCES OF POLLUTION: WATER, OIL, MISCELLANEOUS

Location Symbol	WATER POLLUTION
1	Honouliuli Steam; Silt, Pesticides, Herbicides, Fertilizer
2	Residential Area Sewage
3	Laulaunui Is. Animal Research Fac., Animal Waste
4	Drainage Ditch. Silt
5	Waikele Steam. Silt, Pesticides, Herbicides, Fertilizer
6	City & County Rubbish Dump, Seepage From
7	Waipahu Ditch. Raw Sewage & Sugar Mill Wastes
8	Fungicide Application Equip. Wash Water
9	Irrigation Tailwater & Mill Washwater (6 Outlets)
10	" " " " " (10 Outlets) Occasional Discharges 0 - 0.063 MGD
11	Irrigation Tailwater & Mill Washwater (6 Outlets)
12	" " " " " (7 Outlets) Occasional Discharges 0 - 0.063 MGD
13	Pearl City STP. (Primary) Outfall Q= 6.2 MGD
14	Waiawa Stream. Silt, Pesticides, Herbicides, Fertilizer
15	Fire Fighting School. Caustic Water Disch (OBA Cannisters)
16	Waiau Stream. Silt, Pesticides, Herbicides, Fertilizer
17	Waimalu " " " " "
18	Kalauao " " " " "
19	Residential Sewage
20	Aiea Stream. Silt, Pesticides, Herbicides, Fertilizer
21	4" Sewer Outfall. Boat House
22	Halawa Stream. Silt, Pesticides, Herbicides, Fertilizer
23	4" Sewer Outfall
24	" " "
25	" " "
26	" " "
27	" " "
28	" " "
29	" " "
30	" " "
31	Hickam Drainage Canal
32	Iroquois Pt. STP (Primary) Outfall. 0.533 MGD
33	EOD Facility Waste Discharge
34	High Phosphate Detergent Use- Various Areas
47	Oahu Sugar Tailwater & Mill Washwater 0.03 - 4.0 MGD
	U.S. Navy Sewage/Wastes Treatment Plant Discharges
35	Fort Kam STP. Secondary. Harbor Outfall. 7.5 MGD
36	Oil Separation Plant. " " 325 GPM
37	Industrial Waste Tr'tmt Pl. Effluent To Ft. Kam STP
38	Ford Is. (Main Part). Sec. Harbor Outfall 0.25 MGD
39	" " (Bldg. 305). Septic Tank. Leaching Field **
40	" " (Arizona Memorial). Incinerating Toilet **
41	Inactive Ship Maint. Fac. Sec. Leaching Pit 0.012 MGD
42	Degaussing Sta. (Main Sta) Sec. " " 0.004 MGD
43	" "
44	Naval Ammunition Depot ("A" Syst.) Stab. Pond Leaching Pits 0.04 MGD
45	" " " ("B" Syst.) Secondary " " 0.006 MGD
46	" " " (Smoke House) Septic Tank " Field **

** Very Small Quantity

MAP #1 (continued)

Location Symbol	OIL POLLUTION
1	Leaks in Standard Oil Co. Pipe Line (2 Sections)
2	Fleet Firefighting School. Oil Overflow
3	Leaks in Fuel Ballast Line. "H" Piers
4	NSC Dock Fueling Points. Hose Loss
5	Underground Oil From Various Sources
6	Water/Oil Separation Facility. Incomplete Separation
7	Underground Oil From Various Sources
8	Lube & Diesel Line Leaks - Bldg. 88 to "M" Wharves
9	Oil Under Piers
10	Mogas Spillage - NSC, Ewa Junction
11	Oil in Ground & Water - From Previous Fuel Line Leaks
12	Oil in Cooling Water. Power Plant No. 3
13	POL in Sunken Hull. "USS Arizona"
14	" " " " " Utah

	MISCELLANEOUS POLLUTION
1	Hawaiian Elect. Power Plant. Cooling Water Temp.
2	Power Plant No. 2. Cooling Water Temp.
3	" " " 3. " " "
4	Herbicide & Pesticide Use - Various Areas
5	Mercury Seals on Trickling Filters-Mil. & Civilian (Various Areas)

MAP #2 SOURCES OF POLLUTION: AIR, NOISE, BEAUTIFICATION

Location Symbol	AIR POLLUTION
1	Sugar Cane Burning
2	" " "
3	" " "
4	" " "
5	Hawaiian Elect. Power Plant. Smoke
6	Aiea Laundry. Smoke
7	Fire Fighting School. Smoke
8	Incinerator For Classified Wastes
9	" " " "
10	"
11	" " Sawdust. Shipyard
12	Power Plant No. 2. Smoke
13	Power Plant No. 3. "
14	Sandblasting & Paint Spraying-Silica Dust & Paint Fumes
15	Incinerator For Classified Wastes
16	" " " "
17	Steam Plant, Ford Is. Smoke
18	Decaying Vegetation - Makalapa Crater
19	Refuse Transfer Sta. Odor & Dust
20	" " " " " "
21	Boiler Plant. Smoke
22	Sewage Treatment Plant, Iroquois Pt. Continuous Odor
23	B. Lift Stations. Iroquois Pt. Housing
24	Sandblasting & Paint Spraying-Silica Dust & Paint Fumes
25	" " " " " " " " "
26	Asbestos Dust
27	Sanitary Landfill - Odor
28	City & County Garbage Dump - Odor & Dust
29	Sandblasting & Paint Spraying of Buoys
30	Dust From Cane Haul Roads. All Cane Growing Areas
31	Occasional Odors From Sewage Treatment Plants
32	Open Burning - Volatile Wastes (MER)
33	Evaporation From Volatile Ballast Tank 9-775
34	Incinerator For Classified Wastes

	NOISE POLLUTION
1	Air Compressors, Generators, Const. Equip. Etc.
2	Aircraft Overflights - Iroquois Pt. Housing
3	Jet Engine Tests - Hickam AFB
4	Firing At Puuloa Rifle Range
5	Industrial Area Noise NSYD
6	Proposed H-1 Viaduct - Noise to Catlin Park Housing
7	Refuse Transfer Station - NSYD
8	" " " - Hickam Housing
9	Highway Noise Interference - Makalapa BOQ

MAP #2 (continued)

Location Symbol	BEAUTIFICATION (VISUAL POLLUTION)
1	40 Abandoned Automobiles - Navy Utility Corridor
2	5 " " - " " "
3	4 " " - " " "
4	30 " " - " " "
5	3 " " - " " "
6	51 " " " " "
7	60 " Washers and Refrigerators
8	Partially Submerged Boat Hulks (10±)
9	" " " " (1)
10	Shoreline Littered With Remains of Piers, Dolphins & Craft
11	Abandoned Buildings
12	Conc. Clumps, Scrap Iron, Causeway Sections & Collapsed Piers
13	Many Old Pilings. 2 Locations, Aiea & Middle Loch
14	Hulk of Army LCU and 2 Target Sleds
15	Collapsed Piers
16	Old Floats and Pilings
17	Refuse Along Road
18	Pilings, Floats, and Misc. Junk Along Entire Perimeter Of F.I.
19	Old YC1597
20	Boat Hulks
21	Abandoned Wooden Bridge
22	Old Pilings, Concrete & Metal Scrap

162-J

MAP #3 PEARL HARBOR DRAINAGE BASIN: SOURCES OF POLLUTION

Location Symbol	WATER POLLUTION
	Honouliuli Stream
1	Animal Wastes From Tongg's Cattle Ranch
	Waikele Stream
101	NAD Waikele Secondary STP Effluent
102	Animal Wastes (Cattle) (3 Locations)
103	Wheeler Field Housing Stabilization Pond Effluent
104	Kunia Facility Sec. S.T.P. Effluent-Q=0.28 MGD
105	Mililani Town Sec. S.T.P. Q=0.15 MGD, Activated Sludge Process, sewage
106	Dairy Co. 10,000 gpd, TDS 276 ppm, SS 244 ppm, Turbidity 287, pH 7.55, BOD 75 ppm, P 13.8 ppm, N 1.3 ppm
107	Occasional Overflow of Sugar Mill Wash Water
110	Waipio Acres Housing Secondary S.T.P. Q=0.20 MGD Activated Sludge Process
111	Oahu Sugar Irrigation Tailwater
112	Schofield Bks. Secondary S.T.P. Eff. Q=1.72 MGD, Trickling Filter Sewage
	Waiawa Stream
201	Army Radio Sta. Stab. Ponds (Normally No Discharge) Q=0.01 MGD
202	Animal Wastes (Pigs & Cattle)
203	Pacific Palisades Sec. S.T.P. Effluent- Q=.41 MGD Trickling Filter
204	Oahu Sugar Co. Waiawa Ridge Surplus Irr. Water 0-0.063 MGD (5 Outlets)
207	Animal Wastes (Cattle)
	Waiau Stream
301	Oahu Sugar Co. Surplus Irrigation Water
302	Waimano Home Septic Tank Effluent Q=0.20 MGD Sand Filters
	Kalauao Stream
501	20 Acres Scarified Area (Erosion & Stream Silting)
	Aiea Stream
601	Hot Water Discharge From Aiea Sugar Refinery, 2.2 MGD, TDS 459 ppm, Temp 87.5° F, Turbidity 15, BOD 3.5 ppm, P 0.14 ppm, N 0.21 ppm.
	Halawa Stream
701	Animal Quarantine Sec. STP, Q=0.075 MGD Activated Sludge Process Sewage
702	City & County Jail Secondary STP, Q=0.012 MGD, Trickling Filter
704	Halawa Quarry
705	Pre-Stressed Concrete Inc.
706	Pacific Cement & Aggregate Co.
	AIR POLLUTION
108	Sugar Mill Smokestack
703	Nanakuli Paving Co. Asphaltic Conc. Plant (Smoke & Dust)
704	Halawa Quarry (Dust)
705	Pre-Stressed Concrete Inc. (Dust)
706	Pacific Cement and Aggregate Co. (Dust)
	BEAUTIFICATION (VISUAL POLLUTION)
109	Abandoned Circus Equipment and Misc.. Junk
205	Junked Cars
206	National Guard Wharehouse (Deteriorated)

162-K.

~~162k~~

MAP #3 Continued

Location Symbol	BEAUTIFICATION (VISUAL POLLUTION)
503	Junked Cars
708	" "
709	" Appliances

	NOISE POLLUTION
704	Halawa Quarry

LEGEND

▨	Natural Erosion Areas
- - -	Drainage Basin Boundary
~	Major Stream
—·—·—	Military Boundary
STP	Sewage Treatment Plant

Common to all Streams:

- Numerous Storm Drains
- Refuse Discarded by Residents
- Natural Erosion
- Sedimentation

DR. RICHARD MARLAND

Following the establishment of this complete list of sources, the Task Force established highest priority on control of sources of water pollution. For purposes of management of the material, a modified PERT or critical path chart was prepared in which the final solution to each source problem was entered, and steps needed to reach that end would be identified. This, of course, is still incomplete, but I submit for the record a sample of 14 pages of tables with headings: Source Number, Type of Pollution, Steps to Eliminate and Ultimate Solution.

(The above-mentioned tables follow.)

Map Location Symbol	Specific Pollution Source	Type of Pollutant	Steps to Eliminate Pollution	Ultimate Solution
Map 1	Water Pollution			
2	Residential Area Sewage	SEWAGE		Connection to the planned City sewer system & Honouliuli STP
3	Laulaunui Is. Animal Research Facility			Review of Lease
7	Waipahu Ditch--Raw Sewage			Construction of oxidation pond
13	Pearl City STP			Connection to the City sewer system
19	Residential Sewage			
23	4" Sewer Outfalls			Portable Facilities or tie in to City system
24	" " "			
25	" " "			"
26	" " "			"
27	" " "			"
28	" " "			"
29	" " "			"
30	" " "			"
32	Iroquois Pt. STP			Connection to City system (?)
33	EOD Facility Discharge			Septic Tank and leaching field
35	Fort Kam STP			
37	Industrial Waste Plant (Effluent to Ft. Kam)			

Map Location Symbol	Specific Pollution Source	Type of Pollutant	Steps to Eliminate Pollution	Ultimate Solution
Map 1	Water Pollution (Cont.			
38	Ford Island (Main part)	SEWAGE		
39	" " (Bldg. 305)			
40	" " (Arizona Memorial)			
41	Inactive Ship Maint. Facility STP			Study (Need $)
42	Waipio Degaussing Sta. (Main) STP			" " "
43	Waipio Degaussing Sta.			" " "
44	Naval Ammunition Depot ("A" Syst.)			
45	Naval Ammunition Depot ("B" Syst.)			
46	Naval Ammunition Depot (Smoke House)			
Map 3	Water Pollution			
101	NAD Waikele Sec. STP			
103	Wheeler Field Housing Stabilizing Pond Effluent			
104	Kunia Facility Sec. STP			Study (Need $)
105	Mililani Town Sec. STP			Connect to City system
110	Waipio Acres Housing STP			
112	Schofield Bks. Sec. STP			

Map Location Symbol	Specific Pollution Source	Type of Pollutant		Steps to Eliminate Pollution	Ultimate Solution
Map 3	Water Pollution (Cont.)				
201	Waiawa Army Radio Sta. Stabilizing Pond		SEWAGE		No problem (?)
203	Pacific Palisades STP				Connect to City system
302	Waimano Home Septic Tank Effluent				" " " "
701	Animal Quarantine STP				" " " "
702	City & County Jail STP				" " " "
Map 1	Water Pollution				
1	Honouliuli Stream	Streams	SILTATION		
5	Waikele Stream				
14	Waiawa Stream				
16	Waiau Stream				
17	Waimalu Stream				
18	Kalauao Stream				
20	Aiea Stream				
22	Halawa Stream				
4	Drainage Ditch	Miscellaneous			
6	City & County Dump				Construction of dike at water/dump interface
31	Hickam Drainage Canal				

Map Location Symbol	Specific Pollution Source	Type of Pollutant		Steps to Eliminate Pollution	Ultimate Solution
Map 1	Water Pollution Cont.)	Misc.	SILTATION		
9	Irrigation Tailwater				Settling Ponds (?)
10	" "				" "
11	" "				" "
12	" "				" "
	City Storm Sewers				
1	Honouliuli Stream	Pesticides, Herbicides, and Fertilizers	CHEMICAL AND MISCELLANEOUS POLLUTION		
5	Waikele Stream				
6	City & County Dump				Construction of dike at water/dump interface
8	Fungicide Application Equip.--Wash Water				
9	Irrigation Tailwater				Settling Basins (?)
10	" "				" "
11	" "				" "
12	" "				" "
14	Waiawa Stream				
15	Fire Fighting School Cuastic Waste Discharge				Provide neutralizing agen or adapt to use of waste treatment facility
16	Waiau Stream				
17	Waimalu Stream				
18	Kalauao Stream				

Map Location Symbol	Specific Pollution Source	Type of Pollutant		Steps to Eliminate Pollution	Ultimate Solution
Map 1	Water Pollution (Cont.)	Pesticides, Etc.	CHEMICALS AND MISCELLANEOUS POLLUTION		
20	Aiea Stream				
22	Halawa Stream				
7	Waipahu Ditch--Sugar Wastes	Nutrients and Miscellaneous			Settling Ponds (?)
31	Hickam Drainage Canal				
34	High Phosphate Detergent Use				Conduct study and develop policies
37	Industrial Waste Treatment Plant				
	Waikele Spring				
	Waiawa Spring				
	Waimano-Waiau Spring				
	Kalauao Spring				
Map 3	Water Pollution--	Animal Wastes	SEWAGE		
1	Animal Wastes				
102	" "				
202	" "				
207	" "				
106	Dairy Wastes	Agricultural Wastes	CHEMICAL		Construct holding or settling ponds &/or a treatment plant
107	Sugar Mill Wash Water				
601	Aiea Sugar Refinery				"

Map Location Symbol	Specific Pollution Source	Type of Pollutant		Steps to Eliminate Pollution	Ultimate Solution
Map 3	Water Pollution (Cont.)				
704	Halawa Quarry	Quarries	CHEMICALS & MISC.		Increased control
705	Pre-Stressed Conc. Inc.				" "
706	Pacific Cement & Aggregrate Co.				" "
111	Oahu Sugar Irrigation Tailwater	Irrigation	SILTATION		Settling Ponds (?)
204	Oahu Sugar Waiawa Rdg. Surplus Irr. Water				" "
301	Oahu Sugar Surplus Irrigation Water				" "
501	20 Acres Scarified Area				
704	Halawa Quarry	Quarries			Increased control
705	Pre-Stressed Concrete				" "
706	Pacific Cement & Aggregate Co.				" "

Map Location Symbol	Specific Pollution Source	Type of Pollutant	Steps to Eliminate Pollution	Ultimate Solution
Map 1	Miscellaneous Pollution	THERMAL AND MISCELLANEOUS WATER POLLUTION		
1	HECO Power Plant Cooling Water Temp.			Study to determine effect
2	Power Plant #2 Cooling Water Temp.			" " " " Reduce or eliminate
3	Power Plant #3 Cooling Water Temp.			" " "
4	Herbicide & Pesticide Use--Various Areas			Study & develop policy
5	Mercury Seals on Trickling Filters-- Military & Civilian			Replace
	Disposal of Mercury-Bearing Wastes			Stop current disposal Conduct survey, and develop Navy policy
	Sale and Use of High Phosphate Detergents			Conduct study and develop policies
	Dredge Spoils Disposal			Develop procedures Reduce Harbor siltation
	Radioactive Ship Wastes			
Map 1	Oil Pollution	OIL POLLUTION		
1	Leaks in Standard Oil Pipeline			Repair
2	Fire Fighting School--Oil Overflow			Floating cover on tanks
3	Leaks in Fuel Ballast Line, "H" Piers			Repair Project

Map Location Symbol	Specific Pollution Source	Type of Pollutant	Steps to Eliminate Pollution	Ultimate Solution
Map 1	Oil Pollution (Cont.)			
4	NSC Dock Fueling Pts. Hose Loss	OIL POLLUTION		Problem corrected by continuing maintenance
5	Underground Oil From Various Sources			Construct sump collection points to collect oil
6	Water/Oil Separation Facility Leaks			Collect leakage and reprocess
7	Underground Oil From Various Sources			Construct sump collection points to collect oil
8	Lube & Diesel Line Leaks Bldg. 88 to "M" Wharves			Repair Project
9	Oil Under Piers			Skirts around docks & dispersing water spray sys
10	Mogas Spillage--NSC			Collection system
11	Oil in Ground & Water From Previous Leaks			Collection and extraction
12	Oil in Cooling Water Power Plant #3			Repair leaks in tanks
13	POL in Sunken Hull "USS Arizona"			Repair leaks and recover if possible
14	POL in Sunken Hull "USS Utah"			"
	Collection of Oily Wastes From Auto Hobby Shops, Service Sta., Garages, Repair Shops, NAVSTA			Assure wastes are being collected, treated, and disposed of properly
	Collection of Oily Ballast Wastes			Replace bottomless donutts with yard barges like "Juicy Lucy"

Map Location Symbol	Specific Pollution Source	Type of Pollutant	Steps to Eliminate Pollution	Ultimate Solution
Map 2	Air Pollution			
1	Sugar Cane Burning	SMOKE AND MISCELLANEOUS AIR POLLUTION		
2	" " "			
3	" " "			
4	" " "			
5	HECO Power Plant-Smoke			Convert to low-S fuel
6	Aiea Laundry-Smoke			Study to determine effects
7	Fire Fighting School			Relocation or smoke suppression system
8	Incinerator for Classified Wastes			New incinerator conforming to standards or switch to mulchers
9	"			"
10	"			
11	Incinerator for sawdust			Replace with facility for disposal at sanitary landfill
12	Power Plant #2--Smoke			Eliminate (use HECO Power)
13	Power Plant #3--Smoke			" " " "
14	Sandblasting & Paint Spraying--Silica Dust & Paint Fumes			Construct special facility
15	Incinerator for Classified Wastes			New incinerators or switch to mulchers
16	"			"
17	Ford Is. Steam Plant			No problem--conforms to standards
				To be filled by H-1 Constr.

Map Location Symbol	Specific Pollution Source	Type of Pollutant	Steps to Eliminate Pollution	Ultimate Solution
Map 2	Air Pollution			
19	Refuse Transfer Station	MISCELLANEOUS AIR POLLUTION		Relocation of station plus more precautions
20	" " "			"
21	Boiler Plant--Smoke			Study to determine effects
22	Iroquois Pt. STP--Odor			Problem cured by treatment
23	B. Lift Sta.--Iroquois Point Housing			
24	Sandblasting & Paint Spraying--Silica Dust & Paint Fumes			Construct special facility
26	Asbestos Dust			Enclose area, provide exhaust & collection sys.
27	Sanitary Landfill-Odor			Increase cover operations
28	City & County Dump			
29	Sandblasting & Paint Spraying of Buoys			Construct special facility
30	Dust From Cane Roads			
31	Odors from STPs			
32	Open Burning--Volatile Wastes			Construct volatile waste incinerator
33	Evaporation from Volatile Ballast Tank			Replace roof with floating top to tank
34	Incinerator for Classified Wastes			New incinerators or switch to mulchers

Map Location Symbol	Specific Pollution Source	Type of Pollutant	**Steps to Eliminate Pollution**	Ultimate Solution
MAP 3	Air Pollution			
108	Sugar Mill Smokestack	MISCELLANEOUS AIR POLLUTION		
703	Nanakuli Paving Co, Asphaltic Conc. Plant			Increased controls (?)
704	Halawa Quarry			" "
705	Pre-Stressed Conc. Inc.			" "
706	Pacific Cement & Aggregrate Co.			" "

Map Location Symbol	Specific Pollution Source	Type of Pollutant	Steps to Eliminate Pollution	Ultimate Solution
Map 2	Noise Pollution			
1	Air Compressors, Generators, Construction Equip.	MISCELLANEOUS NOISE POLLUTION		Install muffling equipment
2	Aircraft Overflights--Iroquois Pt. Housing			Reef Runway and new runway use patterns
3	Jet Engine Tests--Hickam AFB			Relocation and/or Noise Suppression
5	Industrial Area Noises			Continued monitoring and correction
6	Proposed H-1 Viaduct Noise to CAtlin Park Housing Area			Propor design of highway to eliminate noise
7	Refuse Transfer Station NSYD			Relocation of transfer ramps
8	Refuse Transfer Station Hickam Housing			"
9	Highway Noise Interference--Makalapa BOQ			New BOQ Bldg.
Map 3	Noise Pollution			
704	Halawa Quarry			Increased control (?)
	Noise Survey in Pearl Harbor Shipyard			Reduce noise below 90 DBA
	Noise Pollution at Magazine Areas of NAS BARPT			Affected housing area must be designed soundproof
	Naval Sta. Vehicular Noise Examination			Reduce noise in both Military and Civilian communities

Map Location Symbol	Specific Pollution Source	Type of Pollutant	Steps to Eliminate Pollution	Ultimate Solution
Map 2	Esthetic Pollution			
1	40 Junk Cars	REMOVABLE VISUAL POLLUTANTS		Removal ↓
2	5 " "			
3	4 " "			
4	30 " "			
5	3 " "			
6	51 " "			
7	60 Junk Appliances			
10	Littered Shoreline			
12	Concrete Clumps, Scrap Iron, Causeway Sects. & Collapsed Piers			
13	Many old pilings			
15	Collapsed Piers			
16	Old Floats & Pilings			
17	Litter			
18	Pilings, Floats, Litter			
22	Old Pilings, Concrete & Metal Scrap			

Map Location Symbol	Specific Pollution Source	Type of Pollutant	**Steps to Eliminate Pollution**	**Ultimate Solution**
Map 2	Esthetic Pollution	REMOVABLE VISUAL POLLUTION		
8	Partially Submerged Boat Hulks			**Removal for scrap or fish habitat**
9	" "			
14	" " (3)			
19	Old YC 1397			
20	Boat Hulks			
11	Abandoned Buildings			**Demolition and Removal**
21	Abandoned Bridge			
Map 3	Esthetic Pollution			
109	Abandoned Circus Equip. and Junk			**Removal**
205	Junk Cars			
503	" "			
708	" "			
709	Junk Appliances			**Demolition and Removal**
206	Natl'l Guard Warehouse			

DR. RICHARD MARLAND

Study of this critical path chart shows that control over the majority of water pollution sources calls for actions under 5 headings:

A. Sewage, Navy and Municipal
B. Siltation, Civilian Jurisdiction
C. Solid Waste Management, Navy and Municipal
D. Thermal Pollution, Navy and Municipal
E. Oil Pollution, Navy, Industrial

These sources, or many of them, were confirmed by direct viewing during an extensive tour of all Pearl Harbor through the courtesy of the Navy.

To attack these problems, a series of subcommittees were formed with the charge to develop recommended plans for control over each source. These subcommittees are:

A. Subcommittee on Sewage Treatment Facilities
B. Subcommittee on Siltation Control
C. Subcommittee on Solid Waste Disposal (Waipahu Dump and Incinerator)
D. Subcommittee on Thermal Pollution

Final reports from these subcommittees are not yet ready, of course, but based on preliminary reports, another subcommittee has prepared a general program plan for the Pearl Harbor environment. I submit for the record a brochure entitled "Pearl Harbor." This brochure outlines

(The above-mentioned brochure, marked an Exhibit, is on file at Hq. EPA, Washington, D. C., and Region IX, San Francisco, California.)

the plan of the Pearl Harbor Task Force which calls for:

A. Elimination of pollution

B. Establishment of a protected environment

C. Creation of a living shrine for the best use and enjoyment by all people.

This plan, together with supporting documents and extensive materials prepared by Navy for its budget purposes were presented to various officials in Washington, D. C., during the week of August 30 to September 3, 1971. This plan shows that a total program of abatement of pollution in Pearl Harbor will cost about $100 million and its later management and conversion into a recreational area will cost an estimated additional $150 million. These costs include both public and private funds.

The program calls for a 7-year development; 3 years for pollution abatement and 4 years for restoration and development of the parks, marinas, etc., appropriate to recreational use. These presentations to EPA, Navy and other Federal officials were preceded by an official request from Admiral Hayward that the Navy support his share of the joint program and also his goal to open up portions of Pearl Harbor to the public. I submit for the record a copy of this official request, dated August 31, 1971. (The above-mentioned request follows.)

165a

HEADQUARTERS
U. S. NAVAL BASE
BOX 110
FPO SAN FRANCISCO 96610

IN REPLY REFER TO
48:LGT:dm
3373
31 August 1971

From: Commander, Naval Base, Pearl Harbor
To: Chief of Naval Operations

Subj: Pearl Harbor Pollution Abatement - DEMONSTRATION PROGRAM

Ref: (a) P. L. 91-190
(b) E. O. 11514
(c) P. L. 91-224
(d) Public Health Regulations, State of Hawaii, Chapters 31, 37 and 37-A
(e) BUBUD Circulars A-78 and A-81

Encl: (1) Pearl Harbor Pollution Model Study
(2) Pearl Harbor Demonstration Program, Office of Management and Budget Feeder Reports: "Pollution Status and Control Reports for Pearl Harbor Area"
(3) Pearl Harbor Pollution Abatement Projects
(4) "Pearl Harbor", Brochure prepared by Governor's Office, State of Hawaii
(5) PEARL HARBOR DEMONSTRATION PROGRAM; Plan of Action

1. Since early 1971 Commander Naval Base, Pearl Harbor, in his role as Area Coordinator has vigorously pursued a program of pollution abatement and control in the Pearl Harbor drainage basin. Ad Hoc Committees for source identification and action planning have been formed; Housekeeping Task Forces have been commissioned to clean up Navy controllable problems within the limits of activity resources; a Pearl Harbor Model Study of the basin's environmental degradation has been completed; appearances before federal, local, and private organizations have been made to lend impetus to joint community planning and programming; testimony has been presented at the President's Water Pollution Control Advisory Board's session in Hawaii; and, largely at the Naval Base Commander's urging, the Governor of Hawaii has appointed a blue ribbon Task Force on control of pollution in the Pearl Harbor area.

2. As a consequence of the Navy's efforts to correct its own deficiencies and to identify those attributable to others, the President's Advisory Board, following its Hawaii visit, issued a report containing this statement:

"The Board was favorably impressed by the action program presented by the Navy for restoration of Pearl Harbor. To allow this national shrine to be used as a cesspool would be like using the Grand Canyon to dispose of old cars and solid wastes from the Los Angeles metropolitan area. The

48:LGT:dm
3373

Administrator is urged to continue to do everything possible to encourage the appropriation of funds being requested by the Army, Navy and the Air Force for the Pearl Harbor restoration program."

3. The Board's report further stated:

"The Board recognizes that EPA was established by the President with the responsibility and authority to provide leadership within the Federal government on problems of environmental pollution control. Accordingly, the Board recommends to the Administrator that the agency pursue a vigorous and active role in negotiating with both the social and natural resource agencies to insure that their programs be fashioned to provide for environmental protection and enhancement."

4. In consonance with the foregoing, to keep the momentum thus far attained, and in compliance with references (a) through (e), enclosures (1) through (4) are forwarded.

5. Enclosure (5) is a matrix showing the Plan of Action for executing the Pearl Harbor Demonstration Program represented by the other four enclosures. The plan has been prepared jointly by local Environmental Protection Agency officials and Commander, Naval Base, Pearl Harbor, with the assistance of the Governor's Office of Environmental Quality. The plan proposes that the federal Environmental Protection Agency assume the Lead Agency role in sponsoring the Demonstration Program, in obtaining necessary authorization and appropriation legislation in Fiscal Year 1973 for the Program's accomplishment, and in the transfer of funds to the various responsible agencies for the plan's implementation.

6. The objective of the Plan of Action is to proceed immediately with a Demonstration Program designed to:

- Correct all existing sources of pollution in the Pearl Harbor Drainage Basin

- Protect, control, and manage the clean environment thereafter, and

- Make Pearl Harbor a model place of beauty that can be enjoyed by all, with parks, marinas, and other leisure time facilities bordering its shorelines.

The accomplishment of this objective will serve as a demonstration for all communities of how concerted, cooperative, intensive effort by federal, state, and local government can attack the problems of pollution abatement and surmount the difficulties of environmental management.

48:LGT:dm
3373

Subj: Pearl Harbor Pollution Abatement - DEMONSTRATION PROGRAM

7. It is recommended that the Chief of Naval Operations endorse the concept of the Pearl Harbor Demonstration Program and support the Navy projects within that program in Fiscal Year 1973, either in an omnibus EPA appropriation or in the Navy military construction, operation and maintenance, and other procurement appropriations, should the preferred Plan of Action not succeed.

T. B. HAYWARD

Copy to:
CINCPACFLT (less encl (4))
COMNAVFACENGCOM
COMPACNAVFACENGCOM (less encl (4))
COMFOURTEEN w/o encls
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  Environmental Quality

In the presentation to Mr. Ruckelshaus and his staff, we urged that since this was a truly unique opportunity for EPA to demonstrate a complete environmental restoration and preservation model, that Agency should undertake the role of lead Agency in this demonstration and request suitable funding under a single line item within his Agency's budget.

Mr. Ruckelshaus, his staff, and Mr. Muir, representing the Council on Environmental Quality, applauded the program in principle and pledged to support the plan, but budgetary strictures would not permit the inclusion of such a demonstration in a single line item in EPA's budget. Mr. Ruckelshaus further stated that he could not endorse the 100% funding of municipal sewage treatment facilities as was implied by the plan. At the suggestion of EPA and the Council of Environmental Quality, the plan was modified to show a phased plan within which the annual costs for each participating Federal Agency would be requested separately by that Agency as an earmarked item within its regular budget. State and local shares of sewage treatment facilities needed in the Pearl Harbor Basin would be borne locally under this revision.

Prepared for this contingency, we then made presentations to various Navy officials and obtained assurance that a significant portion of the estimated $25.2 million needed for Navy's pollution control program would be requested in the 1973 budget. We hope that the balance will be provided by Navy over the 3-year schedule we have established for cleaning up Pearl Harbor.

The balance of the Phase I (Pollution Control) of the Pearl Harbor Task Force Plan is submitted for the record of this conference on a table entitled, "Cost Schedule for Phased Program of Pollution Abatement in Pearl Harbor." This table shows the estimated annual costs to EPA, Navy, U. S. Department of Agriculture, U. S. Corps of Engineers, Department of Interior, State of Hawaii, city and county of Honolulu, and private industries of a 3-year schedule of pollution abatement which covers 9 separate program elements. The total estimated cost of this program is $98.1 million. (The above-mentioned document follows.)

Cost Schedule for Phased Program of Pollution Abatement in Pearl Harbor
(millions of dollars)

Program Element	Calendar Year 1972	Calendar Year 1973	Calendar Year 1974	Total	Agencies Responsible
I Lead Agency, Management, Coordination, Supervision	3.4	3.4	3.1	9.9	EPA, State of Hawaii
II Navy Abatement Program	9.2	8.0	8.0	25.2	Navy
III Municipal Sewage Treatment (Honouliuli System)	15.7	17.0	7.0	39.7	EPA, State, City & County
IV Erosion Control	0.1	2.0	7.9	10.0	U.S.D.A., State, Private, U.S.D.O.T.
V Special Studies for Environmental Management	1.0	0.4	0.4	1.8	U.S. Army Corps of Engineers, U.S.Navy, University of Hawaii-Geological Survey
VI Solid Waste Control	0.9	1.6	1.6	4.1	EPA, State, City & County
VII Thermal Pollution, Air & Miscellaneous Sources	1.5	1.5	1.5	4.5	Private Industry, EPA, State
VIII Enforcement	0.1	0.1	0.1	0.3	EPA, State
IX Fish & Wildlife Rehabilitation & Protection	0.1	1.0	1.5	2.6	Interior, State, Private Groups
TOTALS	32.0	35.0	31.1	98.1	

Of particular concern to this conference are the Program Elements II, III, IV and VI. Program II, at a total estimated cost of $25.2 million over the 3 years, is the Navy program which is covered by separate testimony. I will defer Element III, municipal sewage treatment, until later; Element IV is the Soil Erosion Control Program at a total estimated cost of $10.0 million over the 3 years. This program will call for an initial comprehensive study of erosion problems by the U. S. D. A. Soil Conservation Service followed by the implementation of its recommendations by agricultural industries, highway construction contractors and home developers in the Pearl Harbor Basin. Involved in the implementation of this program are impending city and county ordinances dealing with subdivisions and grading which will hopefully be approved by city council at an early date. The State Department of Health is already preparing an implementation plan which cites this ordinance and specifies the conditions under which a contractor must apply the best practicable treatment to prevent erosion into streams and bays. This will put both State and local control over construction activities associated with land development and agriculture.

The State Department of Transportation will be asked to coordinate its review of Federal Highway

Administration erosion control standards and specifications with the Soil Conservation Service so that the most stringent practical specifications can be applied to all highway construction projects. The State Department of Health will apply its enforcement authority over the execution of these specifications by the contractor, by applying its authority under Chapter 37 and 37A which specify the application of best practicable treatment.

I submit for the record a report from the Pearl Harbor Task Force Siltation Control Subcommittee dated September 17, 1971. (The above-mentioned document follows.)

GOVERNOR'S TASK FORCE ON PEARL HARBOR
COMMITTEE ON SILTATION

Meeting 17 September 1971

Present

D. R. V. Golding	Chairman, Pearl Harbor Task Force
Shizuo Onishi	" " " "
*A. M. Dollar	Dept. of Agriculture
*Fred Haughton	Soil Conservation Service
Francis Lum	Soil Conservation Service
Gene Cox	" " "

Purpose of the meeting was to review and summarize findings to date and to prepare conclusions and recommendations. The committee finds as follows:

1. Nature and extent of the problem. Almost no data are available to define how severe the problem is or what the relative contributions of various sources are. Four sources were considered: natural erosion, agriculture, residential or commercial construction and highway construction. Data from mainland sites show that construction activities cause an order of magnitude more erosion than does agriculture. Data for two gauging stations showed that per unit area, natural erosion from the forest reserve was comparable to erosion rates from the lower elevations. Data for dredging by the Navy at Whiskey Docks 1-5 showed 2000 cubic yards removed in 1970, five years after the previous dredging. Agricultural practices were estimated to be 70% of ideal, with field roads a specific source of the remaining erosion.

   It is apparent, therefore, that data are needed for at least the following:

   a. Magnitude of siltation and relative contribution of sources. At least three specific approaches can be taken to obtain these data:

      (1) Land use and erosion survey, which could begin with a suitable aero survey. (Note: all interested parties should have access to the negatives of such a survey, which has not always been true in past surveys by private contractors.)

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*also member of Pearl Harbor Task Force

(2) Development of an erosion equation by USDA-ARS and Soil Conservation Service. Such models have been useful in the eastern region of the mainland. None have been developed for areas west of the Rockies.

(3) Gauging station data. While it would be desirable that the present system of USGS stations be maintained as a minimum, it was recognized that this is a significant expense to the City & County which may be difficult to justify in a period of great demand for money. Few of these gauges are equipped to measure sediment. Cost of operating sediment gauges was estimated to be of the order of $5000/year/gauge.

The Committee on Siltation therefore recommends: that the Task Force should search for sources of state and federal and state funds with which data suitable for a practical definition of the problem can be developed. The Committee recognizes that few personnel trained in this field are available, so that such a program would be limited to obtaining only essential data needed to define the problem and to develop a plan for control. The Soil Conservation Service, which already has an office in the state, would seem to be the logical base for such a program.

2. Relevant state and local activities. Qualitatively, construction activities have been observed as major causes of erosion with recent specific incidents in other areas as undesirable examples. The Committee therefore concluded that proposed revisions of the City & County grading and subdivision ordinances and the new contractual provisions for erosion control in highway construction contracts are needed urgently. The Committee investigated the status of these revisions and requirements and finds as follows:

a. Grading ordinance. A revised grading ordinance containing new provisions designed to minimize erosion during such operations has been prepared. The final draft has been submitted to counsel for approval prior to transmittal to City Council for action.

b. Highway construction requirements. The State Department of Transportation has developed requirements for erosion control which now are included as part of their contracts. A copy of the requirements is attached.

c. Subdivision ordinance. A revised subdivision ordinance is being prepared. The initial proposal includes several provisions pertaining to erosion and environment, namely:

(1) enforcement provisions (fines)

(2) authority to determine land suitability - e.g. absence of problems such as flooding, soil instability, etc.

(3) design review

(4) review of grading plans and requirement that grading plan include a planting plan

(5) protection of desirable environmental features

(6) erosion control and adequate drainage

(7) special provisions for hillside developments.

These ordinances and requirements were discussed with representatives of the General Contractors Association, City Department of Public Works, City Planning Department and State Highway Division. The Committee concluded that:

(1) If implemented, the revised ordinances represent substantial improvements.

(2) Provision for enforcement of such ordinances is essential if they are to be effective.

(3) Supplemental standards, guidelines and/or manuals are highly desirable adjuncts to such ordinances or contractual requirements, so that all parties will understand clearly what is meant and what must be done.

(4) A program of information and education to explain what is needed and how it may be accomplished is also desirable. The Soil Conservation Service has started such a program with the General Contractors Association. SCS is also preparing a handbook similar to those which have been prepared for some other areas of the country.

The Committee on Siltation therefore recommends: that The Task Force should endorse the concept of improved grading and subdivision ordinances and should so advise the City Council. The endorsement should call for provisions in the ordinances specifically protecting the environment and controlling erosion as well as firm requirements and authority to enforce.

3. Development of plan and schedule for control of siltation in Pearl Harbor. The Committee recognizes that development of a sound plan requires enough data relating to the basin and the harbor to form the basis for reasonable engineering estimates. However, the Committee recommends: that one or more tentative plans should be developed as soon as possible for the following reasons:

a. to provide at least order-of-magnitude estimates of cost. Plans should be realistic and within reach of practical levels of funding;

b. to ensure that suitable data will be obtained. For example, if siltation basins at the mouths of streams appear to be more practical than dams, data should verify this;

c. to ensure that timing is realistic.

DRV Golding
D. R. V. Golding
20 September 1971

DR. RICHARD MARLAND

Program Element VI is the Solid Waste Control Program which is estimated to cost $4.1 million over the 3-year period. The Task Force subcommittee is still studying this problem, but certain objectives are clear. The Waipahu Dump must be circumscribed by a barrier suitable to preventing pollution of West Loch. The area must be used only for disposal of final incinerator residues **during** the life of the incinerator; thereafter, the incinerator should be closed down or relocated. Use of this area for other than incinerator residues must stop as soon as another site can be obtained for a properly managed sanitary landfill. The Waipahu site must also be converted to a proper sanitary landfill. The State of Hawaii can cooperate by assisting the city and county in locating an alternative landfill site. These recommendations are compatible with the new recommendations made by a consulting firm retained by the city and county to develop a long-range plan for solid waste management. These recommendations are also consistent with a recent order from the Director of Health, State of Hawaii, which has already been introduced into the record of this conference.

The specific recommendations to be made by the Task Force subcommittee may vary from this in some degree, but the recommendations will result in a solution which is practical and will afford the best protection to the Pearl

Harbor environment. Its earliest possible implementation will be urged at all levels.

Program Element III describes the municipal sewage treatment program recommended by the Pearl Harbor Task Force. This is the largest single element of cost in the entire schedule, estimated at $39.7 million for the Honouliuli system.

It is important that this conference recognize that this system is only one of many sewage treatment facilities which are of at least equal importance to our people. I shall cite for your information the costs of the several systems which we need, and which we hope to design and construct over the next 3 years. I submit for the record of this conference a table entitled "Estimated Costs of Sewage Treatment Facilities -- State of Hawaii, 1972-1974." This summary table shows that $54.4 million will be needed for the 3-year plan for other systems on Oahu and another $32.3 million for necessary systems in the other counties of the State. This results in a total of $126.4 million for the 3-year period. The elements included on this list are those which were recently submitted to EPA as its Needs list. The intent of EPA was to expedite Federal sharing of the cost of these facilities so as to complete them in 3 years. This fact was reemphasized to members of the Pearl Harbor Task Force by Mr. Ruckelshaus on September 1, 1971. This moral obligation to Hawaii is critical. We hope that EPA will meet it.

This sum of $126.4 million is slightly larger than the amount submitted to EPA under Needs request. The difference is nearly $20 million of elements of the Honouliuli system which were considered to be deferrable at the time of our Needs estimate, but which many members of the Pearl Harbor Task Force believe are needed in the first phase of that system. These additions include the deepsea outfall and certain major lines and force mains which had been deferred. (The above-mentioned cost table follows.)

Estimated Cost of Sewage Treatment Facilities - State of Hawaii, 1972-1974

System	Cost for 1972	Cost for 1973	Cost for 1974	Total
Honouliuli System	15.7	17.0	7.0	39.7
Balance of Oahu	27.4	14.0	13.0	54.4
Balance of State (not Oahu)	16.8	6.3	9.2	32.3
TOTALS	59.9	37.3	29.2	126.4

It is still considered both feasible and desirable to construct this Honouliuli system by the end of 1974. (Based in part on the offer of the Navy to donate a 40-acre site for the secondary treatment plant at the corner of the Barber's Point Naval Air Station). The constraint lies in providing the necessary funds. Under existing rates and formulas, the city and county would be expected to pay 20 percent or about $25.2 million, the State 25 percent or about $31.7 million with EPA paying the balance of 55 percent or $69.5 million. Both local and State governments are ready to provide their share of these costs. We can, and will meet these obligations to provide sanitary sewerage systems to our people. The problem lies in being confident that the Federal Government's share will be available in amounts and on a schedule which will allow us to carry out this 3-year plan.

Based on existing levels of support from EPA, Hawaii is eligible to receive some $4.3 million per year. At this rate, we will be short by $28.7 million in 1972, another $16.3 million in 1973 and still another $11.8 million in 1974. We thus see that under current reimbursement schedules, the Federal Government will fail by some $56.8 million to meet its legal and moral commitment for 's share of the sewage treatment facility program we want to carry out. We hope that this conference, in its recommendations will recognize this defect in the system of allocation and will find a way to assure that the full amount of Federal contribution will be available when needed.

The figures given above do not include the provision for the proposed Mililani Township system in the upper reaches of the Pearl Harbor Basin. These additions, if we are forced by the Federal Government to move immediately on the development of this system would add an estimated $7 to $10 million to the total cost.

We are not yet decided upon the best course of action. We agree that Schofield Barracks should proceed with construction of their new secondary treatment plant. The effluent from this and the proposed Mililani secondary treatment plant could serve as a much needed source of irrigation water for sugar cane fields in that drainage basin. A study is now under way which will determine if the use of these effluents will pose a threat to the water table below the fields. If that study should show that there is no danger to our subsurface water supplies from this practice, then indeed, we should use these effluents to this best advantage. By using them as irrigants, several millions of gallons per day of freshwater would not be needed for irrigation. The only threat to Pearl Harbor from these sources is an occasional, intermittant discharge of highly diluted effluent, from which all microbial contamination has been eliminated. The remaining nutrients would pose no significant threat to Pearl Harbor, assuming other sources are controlled or eliminated.

If we are forced to implement a plan for this region before the current study is completed, we will be forced to abandon this valuable reuse of water, possibly resulting in a connector line to the Honouliuli plant for the transport of raw sewage from all that area. The cost of this connection would likely be in the order of $6 to $7 million over and above the expected contribution which would result from the Army's abandoning its plan to build a secondary plant at Schofield Barracks.

I hope that this conference will see the wisdom of our hope to recycle this water and assist us in implementing the plan which will be developed following the present 3-year study.

While the Pearl Harbor Task Force will soon be developing the specific activities needed under the other program elements of our plan, the State of Hawaii does not believe we can leave hanging any longer the critical [illegible] element III -- the Honouliuli sewage treatment system and the balance of Hawaii's sewerage needs. It is clear that the county governments, including the city and county of Honolulu, cannot and should not be expected to provide both their share and the Federal share of this needed construction. It is also probable that the Federal share of these $127 million cannot be provided in amounts or on a schedule which will meet local needs. But since these needs are both urgent and critical to the health and welfare of our people, the State will take that action which it is hoped will allow all these projects to be constructed on the 3-year schedule called for in the plan of the Task Force.

The State Administration will submit and vigorously support proposed legislation to the next session of the State Legislature which will call for an authorization to sell State bonds in amounts sufficient to meet the total cost of all sewerage treatment facilities included in our current 3-year Needs list. The revenue from these bonds will be available to advance both the local and Federal share of these facilities to the extent that is needed.

The proposed legislation will also call for amortization of the bonds by the repayment of these advances by local and Federal Governments and through State appro- [illegible] State share. Further

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provisions will call for connection charges and sewer use charges to meet interest expense and operating and maintenance costs.

This step will be taken to insure that the State's sewage treatment needs are met, despite uncertainty of Federal reimbursement schedules which leave our local governments unable to meet the problems alone.

It is clear to me that if this conference is indeed to serve the mutual and joint goals of EPA and Hawaii, it will recognize that Hawaii is committed to a course of action which will not only abate the pollution in Pearl Harbor, but will go far beyond that in improving our environment throughout the State. Recognition of this commitment should be accompanied by the pledge of total EPA support for these programs in a manner like that in which the Navy and the Pacific Basin Office, directed by Mr. Freeman have joined both State and local government to help clean up Pearl Harbor. Further, your concurrence with the need for participation by other Federal Agencies in our total plan for a model environment in Pearl Harbor can go far in gaining their support for the huge task we have set.

If these goals are endorsed by this conference, and needed commitments are made as its result, then all

Hawaii, all the United States -- indeed all the world will be the beneficiaries of a Pearl Harbor which has truly become an environmental pearl.

Thank you.

MR. STEIN: Thank you, Dr. Marland. Are there any comments?

MR. O'CONNELL: Well, there was a great deal of information presented here, much of which we're going to have to look at in more detail. I find very encouraging many of the proposals that are made here, and I would hope that these can be pursued along the lines that you described. I would like to, and I hope we will have the opportunity at a later time to look at this in more detail.

MR. STEIN: The spirit, it seems to me, is very significant and a new element in representing experience in the field or what one may term a major statement or breakthrough. I certainly get the feeling that we can go along with this program.

Several other States have prefinanced, and I think that you have to take advantage of this prefinancial thing if you can catch up with it. We did have a program calling for a waste treatment plant on the Island of Manhattan. By the way, all of the waste from Manhattan was going into the Hudson River raw, but when we came up with this plan, it was estimated that the project would cost $220 million. It is a rather expensive project. Then the State began one of these prefinancing plans.

We believe that Dr. Marland has the commendation of the Government which calls for insulation from the lochs in his proposal to say the Waipahu Dump must be circumscribed by a barrier suitable to prevent the pollution of West Loch.

Now I would commend that consideration among others to the conferees. Where that's not an inconsiderable problem to the conferees, what we really have to consider with these statements of Dr. Marland is precisely what kind of treatment we're going to get and where. And if you listened to him intensely, you will note that in several parts of his statement the question was still not completely resolved whether we were going in for secondary treatment or not.

The second point we have to get to is a time schedule which will do the job -- and the precise time schedule.

However, I think Dr. Marland has addressed himself to what we feel is the more important one all the time -- the question of financing. I say there is nothing to the pollution problem except a 5-letter word, and that is money, M-O-N-E-Y. If we get that, we're on our way in solving the financing problem, and seeing our way clear to put the assets of the State into the bond issue and something like that behind us. It has been demonstrated that this does work in other places. If we're over the financing hurdle, and if the State of Hawaii makes it a rule to get over the financing hurdle, we may well be on our way to solving the problem. I want to thank you, Dr. Marland, for a real valuable contribution to this; and your answers on this are very good indeed. The last time I visited this Island was in 1963.

DR. MARLAND: His comment was along the line of what can we do with this problem to sweep away all of these problems and barriers, and get this sewage treatment plant under construction. And I said, "Government will need $120 million." He said, "Fine," and I said, "I'll work with the Comptroller on how we can do this." And then, of course, we are now in the hands of the legislature. I am confident that the Legislature of Hawaii will recognize in the same manner as the executive branch, that these are indeed for the health and welfare of our people.

MR. STEIN: Thank you very much.

We will now take a 10-minute recess.

(RECESS)

MR. STEIN: We will now be convened, please.

FROM THE FLOOR - SAVE OUR SURF

FROM THE FLOOR: Our presentation will be different from anything that you have seen or heard, mainly because none of us are scientists. We will show you some pictures and some facts, and show you probably a good idea of what we're going to do.

We're going to talk about people. We are from Save Our Surf, and all of these kids live on Ewa Beach. As most of you probably know, that's just leeward of the mouth of Pearl Harbor. So we have gone out there today and picked up some fresh specimens from West Loch, from the area near the mouth of Pearl Harbor and along Ewa Beach. We have slides which were taken last weekend, and we want to show them to you first and give you an idea of what it's like to live near West Loch, Pearl Harbor and Ewa Beach and swim in the water every day and the way it affects the life of the people out there.

We're going to start with some slides, and as we go through them the kids will come up and help me tell you something about what's going on.

This is all around the beach.

FROM THE FLOOR: This picture was taken from the West Loch area, and this stuff floats over that comes in from the mouth and comes around and ends up all along the beaches.

FROM THE FLOOR - SAVE OUR SURF

(Children show slides of debris and dead fish.)

FROM THE FLOOR: This shows a picture of the dump and the pollution all clogged up in one bay.

(The children take turns showing pictures of dead fish, and then they bring out real dead fish and a dead young shark. They also display a bottle of water with a very strong odor that they had taken from the area. They discussed the insects that bite them and that their dog could not go swimming any more to get rid of his fleas. They also discussed some kind of sudsy water coming out of pipes.

As they showed the slides and described them, they put exhibits out on the table, marked "S" "H" "I" and "T".)

FROM THE FLOOR: We labeled these exhibits just to explain what we think of the water, the sand, and the dead fish on the shore. I would like to explain that on Ewa Beach they have 2 drainage ditches which we call "Constipation" and "Diarrhea." Constipation Ditch is called that because traffic has moved all of the garbage up and plugged up -- caused the stream to clog up, and it's standing there, and now it's full of mosquitoes as you can see in this slide.

Diarrhea Ditch is called that because when it rains -- when it really pours -- this ditch causes silt and runoff from the mountain to flow into the water, making it red. Ordinarily, you could see down to the bottom, but when it rains you can't see 6 inches down.

These 2 ditches are not in Pearl Harbor. They're down past the Ewa Beach. We have a tremendous drainage problem there. We also have an exhibit of a jar full of mosquitoes and a lot of odorous smell for you.

There's lots of algae to be found along the beach in the salt water and freshwater, and we think it's pretty important that something be done about this. (Indicating on slides.) We had our biology teacher from school come and look at it, and he said it was most likely green bubble algae, mostly found in polluted waters. The strange part about it is that it's real crusty. There's a piece of it lying on the table.

It doesn't take very long until it covers the surface of the reef, and no air or any other thing can get to the reef and the reef is smothered. The reef dies, fish die, the water is allowed to just support bacteria, plant bacteria that give you infections on your legs. So we think it's pretty important when that algae starts to show up on our beaches.

Again, I'll stress that Ewa Beach is on the leeward side of Oahu and the leeward side of Pearl Harbor.

Now, to get to the hammerhead shark that was picked up on the beach this morning. A few years ago a lot of people spent a lot of time and money trying to figure out where the sharks were breeding. Well, this is a good illustration of where they're breeding here in all this garbage and stuff that's coming in from the dump. One man trolled all the way around the Island, and during his period of testing he caught 697 sharks. Out of the 697 over half were caught in Ala Moana and Ewa Beach.

Another thing I'd like to mention is that to people, especially in the leeward area, fishing and limu picking are more than just for fun. People do it so they can have an additional source of food, but that food taken from that polluted water is polluted food. We found dead fish floating everywhere, and you can't tell me that they get clean fish.

Exhibits "S-H-I-T" -- a lot of people think that's a foul word. We can tell you that nothing can be compared to some of the smells and some of the things people go through when they live near that water 365 days a year. So the most important thing to do is to clean it up now. These kids have been in that water probably some of them between 5 and 10 years. In that length of time it's changed quite a bit. Many of them can't remember too well when it was clean; but there are still days when there's Kona weather when there isn't much rain when Diarrhea gets up and flows when you can see the bottom. I am told that at one time, it was always like that.

In the last 5 or 10 years, clean water is now infecting, the reef is now dying. There used to be good fishing, now the fishing is poor. There used to be a healthy smell, now you get a sewer smell.

To wrap it up, 2 points. I think that the people should be concerned. You people should be as concerned as anybody.

MR. STEIN: Well, you know when I was a youngster, we had a creek by the same name as your exhibit and I think that it's probably in the same condition now. But progress came along and I left the area and they built a superhighway that went across the creek, and when I came back I was shocked to see that they had put a sign up and named the creek "Bread Creek."

We will now hear from Stanley Sumida from the Pearl City Community Association.

STANLEY SUMIDA

STATEMENT OF

STANLEY SUMIDA

PEARL CITY COMMUNITY ASSOCIATION

HONOLULU, HAWAII

MR. SUMIDA: My name is Stanley Sumida and I am representing the Pearl City Community Association.

We support the necessity to clean up the pollution in Pearl Harbor. As a community that borders Middle Loch, we have seen Pearl Harbor become the cachement for sewage disposal, industrial and construction wastes and ship bilges. It has taken its toll on excellent fishing grounds, future recreational possibilities and what promised to be lucrative oyster beds.

But the temporary interim project of open air oxidation ponds can only be tolerable if the citizenry can be assured it really is a temporary and short-term measure. We have been subjected to discussions with local officials that indicate "if we have the land" and "if we have the money" the ponds could be phased out of operation within the next 3 to 5 years. We feel there should be a commitment of a time schedule. We also feel that there should be long-range plans so as it will no longer be necessary to resort to objectionable interim measures.

MR. STEIN: Thank you very much.

Nelson Underwood?

MR. UNDERWOOD: Before I give my testimony, I would like to give the testimony of Mr. and Mrs. Terrell of Ewa Beach, who could not be present.

MR. STEIN: While we're doing that, I have some statements from Walter K. Tanaka of the Honowai Elementary School in Waipahu and Edward Uemori of the Waipahu Businessmen's Association. We will put those in as though read.

WALTER K. TANAKA

STATEMENT OF

WALTER K. TANAKA

HONOWAI ELEMENTARY SCHOOL

WAIPAHU, HAWAII

My name is Walter K. Tanaka. I am a resident of Waipahu and a Principal of Honowai Elementary School in the Leeward Oahu School District. I live and work in the area that the sewer treatment plant in question is being discussed today.

As a resident of Waipahu where presently we have 2 oxidation pools to enable the city and county help clean up Pearl Harbor, I am cognizant of the effect pollution of Pearl Harbor has on our lives. I was informed that Pearl Harbor could be opened and developed for recreational purposes as soon as both the Navy, State and county can initiate a total cleanup of the harbor. The changing mode of work days from a 6 to 5 to even 4 days will necessitate our providing areas for recreation for our people. The proximity of Pearl Harbor is a natural site for water sports and recreation for our children and adults of Waipahu.

As an educator working in the perimeter of Pearl Harbor, I can see a tremendous resource for education. There is a trend in education to make school life relevant to the needs of the students through the utilization of our community resources and to insure for student involvement in the life of the community. The development of Pearl Harbor as a park site, therefore, will add not only a recreational site for our people but also a possible educational site for our students in the State school system. We have taken our children to many other places to study ecological matters, areas similar to that of Pearl Harbor. I would certainly like to see Pearl Harbor cleaned to provide us with a very important natural resource that could be studied from a student's point of view.

I realize, gentlemen, that the oxidation pools are necessary, but I am sure the community could tolerate them if we knew that the secondary treatment plant planned for Barbers Point area will be completed by 1975. I feel very strongly that both city and county, State and Federal cooperation must be pooled together to insure that Pearl Harbor be cleaned by 1975.

EDWARD UEMORI

STATEMENT OF

EDWARD UEMORI

WAIPAHU BUSINESSMEN'S ASSOCIATION

WAIPAHU, HAWAII

I am Edward Uemori, a resident of Waipahu and representing the Waipahu Businessmen's Association.

We appreciate this opportunity to testify before you concerning the sewage system for Leeward Oahu, the proposed timetable and the coordinated efforts of the State and Federal Governments to assist in its completion.

Ever since the Federal Government imposed new regulations concerning Pearl Harbor's Middle Loch whereby the city was requested to terminate dumping raw sewage, we have been overly concerned in the manner with which the city had to find to dispose of this sewage.

The waste stabilization pond on the Waipio Peninsula which was completed a few weeks ago will serve, as I understand, as an interim measure until such time as the sewers treatment system can be constructed and connected to serve our area. We have been told that this system will be completed and in operation by June 1976.

Most of us who have lived in Waipahu for all of our lives perhaps have assumed that matters like this are okay so long as we are not affected directly. The people of

Leeward Oahu should be appreciative to the Federal Government for bringing this condition to our attention and to take such bold action in cleaning up your own backyard prior to imposing such standards on other levels of government.

I also feel that the waste stabilization pond as an interim measure may continue to be expanded as additional interim measures unless firm commitments at all levels of government can be made. I believe it would be reasonable to request that the stabilization pond in Waipahu should be the first and last interim measure, and that the target date of June 1976 for the completion and operation of the sewage treatment plant becomes a firm commitment on the part of our city, State, and Federal governments.

I believe through the efforts of committees like yours and other community groups that awareness to problems like this has been brought about and followed up by constructive action.

It is my utmost desire that the testimony given here this morning will serve this purpose.

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STATEMENT OF

MR. AND MRS. ALLEN R. TERRELL

EWA BEACH COMMUNITY ASSOCIATION

EWA BEACH, HAWAII

(READ BY NELSON UNDERWOOD)

MR. UNDERWOOD: Mr. Chairman, members of the committee, conferees, and guests. Mv name is Nelson Underwood. This testimony is part of an ongoing effort of the Ewa Beach Community Association to inform government officials of the needs of our community so that they may be able to serve us to the best of their ability.

As residents of Ewa Beach we strongly support immediate construction of a sewage treatment plant in Leeward Oahu. The oxidation ponds are not adequate to solve the pollution problem in Pearl Harbor, and they create a potential odor, health and mosquito problem in our area. We urge that you take strong action to enforce high water quality standards, so that our city and State governments will proceed immediately on the construction of sewage facilities in Leeward Oahu. We feel this should be a top priority so the waters of Pearl Harbor can be made safe and available for public recreation.

During the period which the ponds must be used, we urge that stringent maintenance procedures be followed to assure that the odor and other problems be kept to a minimum.

Having presented the statement of Mr. and Mrs. Allen R. Terrell, the following statement is mine.

STATEMENT OF NELSON UNDERWOOD

EWA BEACH COMMUNITY ASSOCIATION
EWA BEACH, HAWAII
(SIGNED BY FLORIDA M. UNDERWOOD, PRESIDENT)

The residents of Ewa Beach are concerned as is the Federal Government, about the pollution of our land, air, and ocean water. Ewa Beach is built upon a coral flat barely above sea level, adjacent to Pearl Harbor and with a natural land slope toward the harbor. At present our only means of sewage disposal is by the use of cesspools and a few septic tanks. Many of the cesspools have to be pumped out frequently, and many more are being regularly treated with chemicals. Thus sewage eventually empties into the ocean water along our beaches, often directly so because of the open nature of coral rock. Recent housing developments and buildings now under construction threaten to saturate the coral base of our land with sewage. Thus our ocean water is becoming increasingly contaminated, which robs us of healthy recreation -- swimming, surfing, boating, canoe racing, etc. -- and deprives us, and the whole State, of fish and sea plants valuable for food.

There is conflicting evidence as to whether there will be odors arising from the oxidation ponds recently constructed on Waipio Peninsula. It seems safe to say that they can be free of odor only if weather conditions are ideal (conducive to the growth of algae, no flooding, etc.), if they are properly maintained, and if they are not overloaded. Since the weather is notoriously unreliable, it seems certain that at times there will be offensive odors from these oxidation ponds. Few persons realize that the prevailing winds will bring such odors all the way to Ewa Beach and Makakilo; that Kona winds will bear the odors to Pearl City and Aiea; and that Waipahu, in addition to those winds, will be subjected to these odors because of the land and sea breezes caused by the heating and cooling of land and water. The Environmental Protection Agency is opposed to the discharge of the effluent from these oxidation ponds into Pearl Harbor, except as a very temporary expedient. We agree. And we further seek the elimination of these ponds before uncontrollable conditions do result in further contamination of the air we breathe.

We heartily concur with the desire of the Navy Department and the Federal Government that the Pearl Harbor area be made into a recreation area for the use of the citizens of Oahu and the State of Hawaii. The young people of a Canoe Club sponsored by the Puuloa Hawaiian Civic Club in Ewa Beach are raising money to purchase their own canoe, and they need such quiet waters as those of Pearl Harbor, not rough ocean water, for practice. Offensive odors from these oxidation ponds will not help these young people in their recreational effort, should official permission be granted them for this use of Pearl Harbor waters. No one can reasonably deny the importance of providing wholesome, pleasant recreational facilities for our youth.

The elimination of these oxidation ponds, and the construction of an adequate sewage treatment plant in the Leeward area is closely tied in with the development of land for new homes near Pearl Harbor, which are greatly needed. Much of this development will be done in the area from Ewa Beach to Ewa Village and Honouliuli, as well as around Waipahu, Pearl City, and Aiea. These new developments will necessitate the construction of many more oxidation ponds on Waipio Peninsula, so that the entire peninsula may well be covered with such ponds long before [illegible], the projected cut-off date. However, this development will make economically feasible the construction of a central [illegible] treatment plant, with Ewa Beach and Honouliuli [illegible] in with the rest of the communities from Foster Village to Barbers Point.

To sum up, we believe that it is imperative that a definite and early date be set to end this admittedly temporary and at best marginally effective method of sewage disposal (oxidation ponds), by the construction of a primary and secondary sewage treatment plant. located in a suitably isolated area, adequate to meet the needs of the communities involved.

We commend the EPA for its efforts to learn of our concerns, and thank them for permitting us, the citizens involved, to have a part in planning solutions to our problems.

This is signed by my wife, Florida M. Underwood, President of the Ewa Beach Community Association.

MR. STEIN: Thank you. Are there any comments or questions?

This is a very excellent statement, and I would like to call your attention to one thing. As for the oxidation ponds, I think that when we are going to put in sewage treatment plants, primary and secondary, this is one of the things that we're going to have to consider, and I think we should consider. We have to build these plants, and if they're going to have to have precautions, we're going to have to put in the precautions needed.

GEORGE K. NOBUNAGA

The next speaker will be Mr. George K. Nobunaga of the Waipahu Community Association.

STATEMENT OF
GEORGE K. NOBUNAGA
PRESIDENT, WAIPAHU COMMUNITY ASSOCIATION
WAIPAHU, HAWAII

MR. NOBUNAGA: Mr. Chairman, members of the committee, ladies and gentlemen. My name is George Nobunaga, President of the Waipahu Community Association. My statement is short and simple because prior to this appearing, one of the statements submitted by the Leeward Oahu Association discussed the problems that we had, so my statement will be short.

In Waipahu we have 2 temporary interim oxidation ponds being built, and hopefully in the future there will be no additional ones built. The community would like to have a confirmed target date for the completion of the sewer project from the city and county of Honolulu and the State of Hawaii and that then the oxidation ponds would immediately be phased out.

My additional remark is, Mr. Chairman, our committee would like to thank you and the teenagers that appeared before you, because this is a problem that I am confronted with in my community -- the odor and the problem of the sedimentation as well as the dump. And when we have the winds that change in a different direction I have to call day and night to try to get the State to do something about it, because at this time it's beyond my control.

Thank you again for making it possible for me to appear and to make my presentation.

MR. STEIN: Thank you very much.

That's why we got those young folks in here. For a business such as we are in, for the type of business, we had the most antiseptic language you can imagine. That's what you call oxidation ponds or stabilization ponds, and when they bring in some of the sights and smells, then we really know what we're talking about.

The next speaker will be Dr. John P. Craven, State Coordinator for Marine Affairs.

STATEMENT OF

DR. JOHN P. CRAVEN

STATE COORDINATOR FOR MARINE AFFAIRS

HONOLULU, HAWAII

DR. CRAVEN: Following Dr. Marland's testimony, he raised the question of the long-time decision between primary and secondary treatment plants. And I propose in this testimony to speak solely to that problem as a matter of primary concern for any recommendation for any area of Hawaii.

DR. JOHN P. CRAVEN

Certainly, the most environmentally sound treatment of sewage cannot be determined on an absolute basis. It is very much a function of the nature and composition of the waste input in terms of its biological and chemical mix and the ratio of industrial, urban and agricultural effluent. It is also highly dependent on the characteristic of the final receiving body of water or of land into which the sewage effluent is discharged. What is desired is that the nature of the effluent match the character of receiving waters such that pathogenic bacteria and viral vectors be terminated, that pesticides and heavy metals do not enter the food chain at unacceptable levels, that the receiving waters be aesthetically acceptable as perceived by viewers having easy or frequent visual access and that the effluent beneficiate the environment by helping to maintain a balance between oligotrophic and eutrophic limits.

In future designs here in Hawaii it is possible to insure that the receiving waters will be well offshore in waters whose depth increases rapidly as compared with most continental shelf topographies. Because of the absence of upwelling in Hawaiian waters they are in general nutrient-poor and deficient insofar as sustaining a significant local fish population. This situation can be remedied locally by the introduction of sewage effluent. Unfortunately, successive levels of sewage treatment from primary to secondary progressively convert the biological form of the effluent into chemical constituents. In layman's parlance organic fertilizer is converted into inorganic fertilizer. For example, the discharge of secondary treated effluent into Kaneohe Bay has resulted in the growth of dictospheria cavernosa, a bubble algae which is destructive to corals. The conversion of bubble algae into fish is unacceptably slow because of the lack of appropriate herbivores. On the other hand, in the same bay a number of whales are kept by the Naval Undersea Research Center. Whale fece is very similar in composition to primary effluent. The localized environment in which these whales are confined is rich in zooplankton, planktivoric nehu, carnivorous aholehole and young Jacks. This is not surprising since studies of zooplankton nutrition indicate that the presence of organic detritus as is found in partially treated sewage is conducive to growth, whereas the presence of phytoplankton whose growth has been the result of more fully treated effluent is a much less efficient zooplankton food (Saunders - "Some Aspects of Feeding in Zooplankton"). In an overly simplified way, it may be said that fish feed on untreated effluents and plants and algae feed on treated effluents, and that the conversion from plant to fish is slow and inefficient. All other things being equal then, the most untreated effluent is the most environmentally desirable when discharging into waters of low nutrient content and where the volume of receiving waters is large as compared with the quantity of effluent discharge.

When the receiving waters are oceanic, the saline properties of receiving waters will quickly kill pathogenic bacteria. The absence of shellfish in the deep waters at the outlet will terminate viral vectors. The control of DDT and heavy metals is and should be accomplished by monitoring and regulating potential sources. The distance from shore, the thermal gradient and the dilution ratio can be chosen to assure aesthetic acceptability.

In summary, no apparent gain can be attributed to secondary treatment. Indeed, secondary treatment will result in a discharge which is environmentally inferior. The State of Hawaii ought not expend large sums of money to do a useless job. It certainly ought not expend large sums of money to reduce the benefit that primary effluent can provide to its environment.

I talked to Scott Henderson at the Naval Underwater Center. The following are his observations on whale manure and the other biotic organisms in close proximity:

1. Whale manure is relatively liquid and breaks up quickly.

2. No large pieces of excrement are fed upon as a regular thing.

3. Crustaceans are growing and probably make use of seaweed (and perhaps macro-nutrients).

4. Aholehole are the most common fish there. He thinks they are there because of the protection afforded by the fences and the feed that escape the whales.

5. Young Jacks are also found there for pretty much the same reasons.

6. Nehu are present in some numbers, but he thinks protection is the more obvious function and feed (phytoplankton) may be less important.

7. He doubts that any large organisms feed directly on whale excrement, but he believes that it is available immediately to lower organisms.

MR. STEIN: Any comments or questions?

I'm a little confused on one point. If I understood your theory, any kind of treatment would make it less valuable to dissolved plankton. If this is true, do you mean that we shouldn't have any treatment at all?

DR. CRAVEN: At that point, it would be an [illegible] problem.

MR. STEIN: No. You said that the State of Hawaii ought not to expend large sums of money to do a useless thing.

DR. CRAVEN: Well, you can have a common unit and break it up into small pieces. You've got to keep the pieces from coming back to shore; there's no question about that.

MR. STEIN: Well, according to your statement, you want to eliminate primary treatment, too.

DR. CRAVEN: Yes, sir.

MR. STEIN: Well, you say that Hawaii and Honolulu are spending-foolishly spending-money on primary treatment. Do you think that all they've got to do is grind it up -- the floatables -- and just get rid of the floatables and let it go out?

DR. CRAVEN: I think that should be considered.

MR. STEIN: I just wanted to get your views.

MR. O'CONNELL: I have a comment. I find it a little difficult to accept the thesis myself; plus the things you mentioned about the termination of the viral pathogenic content and toxic materials and appearance. All of those things are aided by secondary treatment. That's the additional stuff over primary treatment. Insofar as conversion is concerned, perhaps it would be slower. I can see where it would eventually -- a steady state situation would develop, but a speeded conversion may not be all that important.

All in all, it's a little hard for me to follow it.

DR. CRAVEN: If I understand what you said, you just said that the secondary treatment flows in and is equally as good as the less treatment that I have cited, but a little smaller. That's just what I said, that's true; although there is a little hesitation for the secondary treatment. And on the one point that you did raise, which was, was there any difference between the pathogens and the virus as a result of this treatment; and perhaps somebody who is speaking a little bit later can help. But we are doing a very long and extensive review in this State on the effect of coliform being discharged into ocean waters -- saline waters. The lifetime of the pathogens is very, very high indeed. And with any calculations with the rate at which these pathogens are going to disperse and their lifetime, there just isn't any biological problem.

Now the viral problem is a problem more difficult to consider because the question of the transmission of the virus to a fish is still a question of exploration by scientists. On the other side of the coin, it is not impossible that sometime in the future there may be virus on the fish. We're dealing here with an academic question

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in which evidence indicates that we've not any particular problem. So, it is indeed true that a secondary treatment will kill more of the pathogens that will be killed by the salt water anyhow, and that's just what the point of my statement was.

MR. STEIN: Doctor, I don't see why you're arguing with secondary, primary treatment. As I understand, your thesis is that we don't need any treatment at all if we're going to a deep ocean outfall. If we provide any treatment, all we're doing is switching from organic problems to inorganic problems or fertilization at a cost which shouldn't be borne by the taxpayers.

DR. CRAVEN: You've tracked the argument very well, sir.

I would like to go a little further. I mean that minimum treatment would be acceptable.

MR. STEIN: In other words, you think that all of the taxes that will pay for the primary treatment --

DR. CRAVEN: (Interrupting) I don't think that the nature of the present political environment is such that we can walk back past the primary treatment.

MR. STEIN: Well, we have people on both sides. Some people want to push it on to tertiary or more, and the political environment isn't ready for that.

DR. JOHN P. CRAVEN

I understand your thesis.

Are there any other comments? Thank you very much.

That's all we have, and we will recess until 9:30 tomorrow morning.

(Whereupon, the conference was recessed, to be reconvened at 9:30 a.m., September 22, 1971.)

SEPTEMBER 22, 1971

9:30 a.m.

MR. STEIN: May we reconvene.

Mr. Nobunaga made a statement yesterday, and he would like to have a brief opportunity to correct and amend his statement. Mr. Nobunaga.

FURTHER STATEMENT OF
GEORGE K. NOBUNAGA
PRESIDENT, WAIPAHU COMMUNITY ASSOCIATION
WAIPAHU, HAWAII

MR. NOBUNAGA: Mr. Chairman, members of the committee, ladies and gentlemen. My name is George Nobunaga, and I appeared here yesterday morning. And in my statement, I mentioned about the Waipahu Dump and its degradation form. I would like to make a correction that there have been no complaints from the stabilization authorities which has been in existence for a week. This is the correction which I would like to make at this time.

MR. STEIN: Thank you very much.

Dr. Quisenberry.

DR. QUISENBERRY: Thank you very much. We will be hearing from the State representatives today. We will have a presentation from Dr. Alexander M. Dollar of the Hawaii Department of Agriculture, and he's also a Liaison Member of the Pearl Harbor Task Force.

STATEMENT OF

DR. ALEXANDER M. DOLLAR

HAWAII DEPARTMENT OF AGRICULTURE

AND

LIAISON MEMBER OF THE PEARL HARBOR TASK FORCE

HONOLULU, HAWAII

DR. DOLLAR: Mr. Chairman, conferees, ladies and gentlemen. My statement relates to the activities as a liaison member of the Pearl Harbor Task Force, and is concerned with the agricultural activities that affect the water quality.

Agricultural activities in the Pearl Harbor drainage are predominantly related to production of sugar and pineapple. Secondary agricultural activities are relatively minor except for animal husbandry operations. Improperly managed animal feeding operations can increase the nutrient content of surface and subsurface waters. For more than 30 years marginal lands at lower elevations and adjacent to sugar and pineapple growing areas have been

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used for swine production. In addition a few cattle have been raised to supplement income. Identification and control of these minor animal husbandry operations is a part of the overall plan for maintaining and improving the environmental quality of Pearl Harbor.

As part of the statewide effort to prevent further degradation of our environment the Department of Agriculture staff conducted site surveys of animal and poultry operations and have identified potential sources of nutrients from diversified agricultural activities which may affect eutrophication of Pearl Harbor.

Animal husbandry operations are located in most of the valleys draining to Pearl Harbor. The average daily population of swine on streams draining into West Loch is less than 500; into Middle Loch less than 650; and into East Loch less than 1050. There are only 24 identified swine operations but only 10 feed more than 20 animals. Most of the owners and operators are at or near retirement age and will cease operations in the near future. The younger farmers are aware of the environmental problems and are concerned with upgrading their operations.

Cattle operations located in the Waikele and Honouliuli stream areas will have only minor effects on the streams during periods of excessive rainfall. [illegible] and nutrient rich liquid wastes are all assimilated in pasture lands or are used for irrigation of various crops.

The only dairy which operates in the Pearl Harbor drainage is improving resting and feeding areas to divert storm drainage and to retain and absorb liquid wastes from the dairy operations. The nearly 700 head in the dairy herd are confined on 83 acres of land. Present improvements in stormwater diversion and in liquid waste handling have minimized elution of nutrients.

Control of liquid waste discharges will be reevaluated in 1972 and complete control is expected by December 1973.

Animal husbandry operations are located on most of the valleys draining into Pearl Harbor (Table 1). Swine feeding operations are the most serious source of animal waste pollutants which may affect water quality. The primary effort is to achieve early control and abatement of these identified sources of animal wastes.

State Departments of Agriculture, Land and Natural Resources, Planning and Economic Development, with the assistance of city and county and private organizations are actively seeking one or more suitable sites for swine operations on private or State lands. This effort will favor consolidation of swine operations under conditions which will prevent undesirable environmental impacts. All other operations now retain liquid or solid wastes which are distributed on the land or to other users for soil improvement.

The polluting effects of other diversified agricultural operations are limited. Approximately 30 acres of watercress are cultivated in the Waiau and Waiawa spring areas. Less than 30 more acres are devoted to truck or ornamental crops at lower elevations around Pearl Harbor. These are intensive culture operations requiring carefully controlled irrigation and pest control.

Abatement of existing sources of uncontrolled animal wastes will be completed by 1973 through relocation of operations or development of suitable containment and disposal systems.

Broad agency participation is required to achieve the desired goal of rehabilitation of the Pearl Harbor resource. While the Department of Agriculture programs are primarily regulatory in nature, through the Governor's Agricultural Coordinating Committee, other State agencies having common interests cooperate in the resolution of problems. The Department of Land and Natural Resources assists in land use problems and the Department of Health acts on health and environmental regulatory matters. This broad interagency approach is mobilized and is developing feasible solutions to enhance environmental quality.

(The following Table, "Animal Waste Control," is referred to by Dr. Dollar on Page 210.)

Table 1.

Animal Waste Control

Basin	Stream	Number of Operations	Daily Animal Population Average	Action to Control Waste
West Loch	Honouliuli	2 swine 1 horses	490 10-15	Lagoon improvements or termination by 1973.
West Loch	Waikele	1 swine 1 dairy	Less than 10 660	Pasture assimilation. No drainage. Lagoon improvement and disposal by irrigation.
Middle Loch	Waiawa	4 swine	420	Lagoon improvements or septic tanks.
Middle Loch	Waiawa Spring	11 swine	220	Relocation 1973.
East Loch	Waimalu	5 swine	1000	Lagoon improvements or relocation by 1973.
	Waiau	1 swine	30	Lagoon improvement or relocation by 1973.
	Halawa	1 Animal Quarantine Station.	1200	City sewer connection by 1973.

DR. QUISENBERRY: Thank you very much, Dr. Dollar. Are there any questions?

MR. O'CONNELL: With regard to the improvements that will be made in the animal feeding operations, are there State or Federal grant funds that will be used for this, or is this at the cost of the -- will that be borne solely by the individual?

DR. DOLLAR: There are funds available, primarily to be borne by the Board of Soil Conservation. They have a very active program. The USDA has a very active program of environmental improvement, and through this program, they do have funds available for extension of retention ponds and for stabilization and for septic tanks; and again the State Department of Health continues to grant the improvement permits for construction here.

DR. QUISENBERRY: Thank you.

MR. STEIN: I have one comment, Doctor. I don't know what the situation is. If we are talking about shellfish and as we have outlined it's a very extensive program of sewage control; if we are going to have a high coliform related to animal runoff -- we may be frustrated in our objectives. And I think that your program indicates that we are going to cut that back, as your dates coincide with the earlier date that we heard in 1973.

However, I would think that for everyone's protection, if we're going to reclaim this area, that it might be wise if you would consider the possibility of checking with interim reports as to how this program is proceeding.

I think you may be running into a problem if we come up to 1973. Frankly, we have all of the human wastes to contend with, but we don't have the animal.

DR. DOLLAR: Well, we are subjecting these areas to constant reviews. We have people in the area in the field, and they are aware of the problem, and they are following up on what can be done.

The University has put in a great deal of effort in assisting in this program, but we have no method of absolute monitoring at this time.

MR. STEIN: I am not suggesting monitoring. I am just simply trying to make any program work. The agricultural program that you have outlined may be a small part, but I think it's a vital part.

I don't think that your program would be amenable to checking perhaps every 6 months or so to see how far along the people are along the lines of meeting the schedule.

DR. DOLLAR: This is correct, and part of that program is identifying the areas for relocation, and this is going on actively all the time.

MR. STEIN: Thank you very much.

DR. QUISENBERRY: Could I ask one more question? Dr. Dollar knows how difficult it is on these agricultural operations to control the discharge problem, but the rains do cause some special problems. He mentioned that, and as you know, one of our dairies -- not one mentioned here -- is asking for a zone of mixing, based on their anticipation of stormwater problems. This is not their usual normal operation.

Do you feel that they will be able, in all of the agricultural operations -- not only the dairies, but the piggeries -- to control this so that they will not have any discharge running into Pearl Harbor eventually?

DR. DOLLAR: The ones that we have real concern about here are the ones that need to be relocated, and even the small ones, even these would be serious. However, the others are in agricultural areas, and in the drainage fields the waste fails to show up. It's absent except in a few exceptions, and there we have a plan for, I presume, 50-year rains. I don't know what the extent of them would be, but we have been hit by these where we were not supposed to be.

RICHARD SHARPLESS

DR. QUISENBERRY: We will now hear from Mr. Richard Sharpless, Managing Director of the city and county of Honolulu who will make a presentation for the city of Honolulu.

FURTHER STATEMENT OF
RICHARD K. SHARPLESS
MANAGING DIRECTOR
of the
CITY AND COUNTY OF HONOLULU

MR. SHARPLESS: Mr. Chairman, conferees, ladies and gentlemen. You may recall that when I appeared here yesterday morning to welcome the members of the conference, I indicated that I would be back to testify on behalf of the city and county. This is such time.

I am going to read my prepared statement which was prepared over the weekend, which will necessitate my supplementing it from time to time, and I may depart from it for other reasons. And to the members of the conference, I have no objections to being interrupted if there is any particular point that I am discussing that you want to stop me and ask a question, please do so.

By September 15, 1971 letter to the Honorable Frank F. Fasi, Mayor, city and county of Honolulu, L. Russell Freeman, Director, Pacific Islands Region, Region IX, Environmental Protection Agency, stated that "In accordance with Section 10d of the Federal Water Pollution Control Act (33USC et seq) the Administrator, Environmental Protection Agency has called a conference to determine the extent of pollution of the waters of Pearl Harbor with special reference to the effects of pollution on shellfish."

The mayor gave me this assignment last Saturday afternoon, and I started working on it over the weekend, and the first thing I saw was the word "shellfish." I knew -- at least I thought I knew -- that shellfish weren't fish, but I wasn't quite sure what they were, so I looked it up in the dictionary. The Oxford Universal Dictionary, Third Edition, defines shellfish as "any animal living in water whose outer covering is a shell, whether testaceous, as an oyster, or crustaceous, as a crab."

In compliance with the request contained in Mr. Freeman's letter, the city and county of Honolulu submits the following information on the status of waste discharge from facilities under its jurisdiction, into Pearl Harbor, as defined for the purpose of the conference. All of the information herein has been made public from time to time heretofore.

The request recognizes that Pearl Harbor water cannot be isolated and considered by itself, but must be considered as a part of the Oahu water quality whole. This observation leads to the point that in the Hawaiian Islands the city and county of Honolulu has pioneered the investigation and improvement of water quality. Our comprehensive long-range program which began several years ago, should be completed by the end of this year. Our goal is to improve the quality of all Oahu water.

The consideration of several parts of the whole, namely, Sand Island, Kaneohe-Kailua, and Pearl Harbor, has been advanced in time, because of their importance. We have the recommendations and programs to follow and a city-funded timetable of 5 years to complete work on these high priority projects. Implementation has already begun, and site preparation on the first project -- the advanced primary treatment plant on Sand Island -- will begin within this fiscal year.

Turning to the Pearl Harbor part of the whole, let's take a brief look backward. A decade ago the city and county of Honolulu was discharging about 3 million gallons per day of raw and partially treated sewage into Pearl Harbor at 6 different locations, including the mouth of Halawa Stream, East Loch, Kalauao, Waimalu, Middle Loch and West Loch. At that time the Navy was discharging about a quarter of a million gallons per day of raw sewage into

Pearl Harbor at McGrew Point, Manana and Pearl City Peninsula. Within the past 2½ years all of these sources including the Navy's have been cleaned up by the city and county of Honolulu. Just the other day, after 50 years in existence, we put an end to the last source by providing stabilization pond treatment of the Waipahu area waste. Sewage from the other sources now receives primary treatment and cholorination at the Pearl City plant before being discharged into Pearl Harbor.

Let me digress for a moment, because this has been discussed by several people today. With respect to the location, it's on Navy land which is leased to the Oahu Sugar Company, and according to my information, this is about a half a mile away from the nearest habitation.

So far as design and operation are concerned, our people tell me that it has been designed with our own Hawaiian experience in mind, and that they think this will work, and that they will do their best to see that it is maintained. But if, for any reason, it looks like things are not working out, we will have to have the help of your better Agency.

With respect to the time, the ponds are directly related to the establishment of the Honolulu unit system, so when it is established the ponds will be out.

MR. STEIN: Mr. Sharpless, rather than wait to see if it works, would you entertain the idea and suggestion of getting together with the Federal and State people now so that they can make a determination?

MR. SHARPLESS: I think that is an excellent suggestion. I will convey that to our people. We might as well see what we can find out now.

The situation is not ideal, but is a lot better than the conditions which existed a few years ago. Measures toward abatement have been taken.

As Mr. Freeman's letter stated that the waters subject to this hearing are considered to include the waters of Mamala Bay, in the vicinity of Pearl Harbor entrance, I will turn to Mamala Bay which extends from Barbers Point on the west to Diamond Head on the east. As streams flow into Pearl Harbor, so Pearl Harbor water flows into the Mamala Bay area of the Pacific Ocean. The water quality of the ocean around Oahu cannot be improved without improving the quality of the waters such as Pearl Harbor which flow into it.

The sewers of the city and county of Honolulu discharge about 55 million gallons of raw waste per day into Mamala Bay off Sand Island. Hence, the top priority of our water quality program is corrective action on the Sand Island discharge. This we plan to correct at least initially by construction of a unique advanced primary treatment plant with an extended depth ocean outfall. This system, estimated to cost $20 million-plus is under design, and as I mentioned earlier, site preparation will begin this fiscal year. The Sand Island system will treat not only municipal waste but also industrial waste and waste from the Army's Fort Shafter system, now being discharged separately. Construction will be started in 1972 and the system will be operational by the end of 1974.

Returning to Pearl Harbor, let's look at the future. The primary Pearl Harbor recommendations of the water quality program are:

1. Elimination of all city outfalls now discharging into Pearl Harbor;

2. Construction of a treatment plant at Honouliuli and an extended ocean outfall off Ewa; and

3. Use of treated effluent for irrigation wherever possible.

The Honouliuli plant will receive sewage from all sources from Foster Village on the east to Barbers Point on the west. This system will cost an estimated $21 million initially with another $14 million earmarked for expansion by 1980. Bear in mind, I said for the moment. My recollection is that it's some different from the figure offered by a statement yesterday, and I think maybe that they are thinking that there may be a slight difference in yesterday's costs.

The city sees Honouliuli as a regional system serving the west end of areas discharing into Mamala Bay while Sand Island will serve the east end.

Only Sand Island and Kaneohe-Kailua have higher priority than Honouliuli. Both Sand Island and Kaneohe-Kailua are in design. Kaneohe-Kailua, estimated at $11 million, is targeted for completion 3 years from now. Thus, the city and county of Honolulu fully expects to have 2 of its 3 major water pollution problems substantially under control within 3 years.

Why not Honouliuli also? The answer is money.

Besides the liquid waste problem, the city also faces a costly solid waste disposal problem. Here also we have conducted recent comprehensive studies. Together with our consultant, Metcalf and Eddy, Inc., the city and county of Honolulu has prepared a master plan and chartered a course of action, encompassing both the long and short-range activities needed. The implementation of this plan is estimated to cost $245 million over the next 20 years. $44 million of it in the first 5 years.

RICHARD K. SHARPLESS

Oahu has a land area of 607 square miles, which is 9 percent of the State's land area. On this 9 percent live 82 percent of the people of the State. The quantity of solid waste is directly related to population. Much of Oahu's land is comprised of mountains and valleys which are in forest reserve to protect our world-famous water supply. For the remaining land, the competition is intense. Government uses for education, recreation and transportation and private uses of land for business, industry and housing leave little for solid waste disposal use.

Paramount in our solid waste plans is the phasing out of the Waipahu Dumpsite which borders Pearl Harbor. We have several alternate solutions to this problem that directly relate to your interest here today. The most optimistic alternative calls for the city completely phasing out the Waipahu site for unburnt refuse within a year, leaving it only for burial of incinerator ash. If we had to, this could be done. I must say, when -- I didn't realize at the time that I prepared this that there was a 90-day notice from the State on combustibles. Of course, we will comply. I also note the ideas of the State with respect to circumscribing the dump area so that there will be no more leakage from it. We would replace Waipahu Landfill with the Robinson Quarry site on Barbers Point. This 40-acre site is about used up and Pacific Concrete and Rock officials have indicated their willingness to begin moving their quarry operations elsewhere. This would leave a deep 40-acre hole that the city could use for a period of 7 years before it is completely covered. In the meantime we'd be lining up another site.

The present Federal Grant program for wastewater treatment and collection systems provides for sharing of costs among the Federal, State and local Governments. Taking our long-range water pollution control construction estimates into consideration, we come up with the following schedule: The first 10 years, the Federal share would be $81 million; State share, $37 million; Honolulu share, $30 million; total, $148 million. In 50 years, it would be Federal share, $146 million; the State share would be $66 million; and the Honolulu would be $53 million; total, $265 million.

Please bear in mind -- this is something that frequently is not thought about by you people, but the city and county of Honolulu contains about 82 percent of the State's population. Thus, when you're talking about the State for money purposes, you're talking about the city and county of Honolulu, or the people that live there and the businesses that are there. So they will bear a large proportion of any money, whether it's State or whether it's county.

Let me again digress a moment. In the State's presentation there was some limitation yesterday on the Federal Government amount of money that was available for this purpose; and to put the matter mildly, it is needed. As I recall, it was on the order of $6 million a year; and we said for capital purposes $6 million a year; and our ordinary sewer improvement capital, not to mention any extraordinary improvements -- I am hopeful that our delegation in Congress will do all that they possibly can to increase the Federal funding to make this possible.

Furthermore, experience has shown us that Federal funds for this purpose are just not available in the required amounts at the time they are needed. This creates a situation where the city is forced to pick up the tab in advance and seek reimbursement from the other governments at a later date.

These liquid and solid waste control programs are among the largest, but not by any means the only ones we have to continue. Among the others are urban transportation and park land acquisition, and I could name others.

We can accelerate the Honouliuli timetable to 3 years if the State and Federal Governments provide the money.

Under Federal law, if the State provides 25 percent of the construction cost of a city's sewage treatment, the U.S.A. will come up with as much as 55 percent of the costs. This is the theory. But the fact is that the city has been footing its water pollution bills largely on its own, thus increasing the city share to 2/3 and decreasing the Federal share to 1/3. In this strange mathematical game the city gets more from the Feds as the State gives more, but the city gets less from the Feds if the State doesn't cough up its fair share.

The policy question the State must answer is: Is it important enough to the State to clean up pollution plagueing 82 percent of its people or not? I think it is, but then I am not at the State level.

Let's take a look at the comments of Dr. Marland yesterday on behalf of the State. I feel most positive, and I'm sure everybody at the city and county level is, about the offer of the State executive branch to go all out with the legislature to get adequate funding for all of these needs. And we will certainly join in that effort and ask the legislature to see that we get adequate funding, because that's the only problem.

Let's take a look at the idea of a sewer service charge. How much would it bring in? If we assume a reasonable average charge of 10 cents per 1,000 gallons of wastewater treated by the city system we could derive $2.6 million annually. This is based on the 70 million gallons per day we are now discharging. Double it and you are approaching the cost people pay for pure water, but you're still not getting much over $5 million a year. This will help cover operational costs, but it cannot be relied upon to foot any substantial portion of our water pollution control capital costs for construction and provide the funds as quickly as desired by all.

What the city needs is not only more money from the Federal and State Governments but also more timely receipt of those funds.

We cannot legally advertise for bids until funds are available. This means that the city will have to advance the Federal and State monies unless some scheme can be worked out to provide these monies at an earlier date, and I've already commented on the State government.

Take Honouliuli, for instance. Given the money -- and the promised site -- the city can have it operable within the 3-year time frame we have for the other top priority plants at Sand Island Kaneohe-Kailua. To make the 3-year program work, we must have title to the treatment site by January 1972, pipeline and other easements within 3 months after receiving approval of the alignment, and all construction funds including State and Federal shares by January of 1973. The implementation schedule must relate realistically both financing and construction deadlines. The city will do its part to meet the 3-year program. The State and Federal must likewise do their part to meet their obligation.

Gentlemen, thank you and aloha. The people of Honolulu greatly appreciate your efforts and support.

MR. STEIN: Thank you, Mr. Sharpless.

DR. QUISENBERRY: Mr. Chairman, could I ask Mr. Sharpless if he would expand a little bit more on his statement that the city will do its part to meet the 3-year program. Does this include the possibility of selling bonds to finance this portion of the cost?

MR. SHARPLESS: Yes.

DR. QUISENBERRY: To what extent are you thinking of, Mr. Sharpless?

MR. SHARPLESS: I don't have any specifics on this at the moment. There are too many other problems that will have to be considered, which, of course, will have to be done by our council rather than the executive branch of the city and county.

DR. QUISENBERRY: And might it improve on the 20 percent the total contributions that the State and Federal come up with if they came up with the remainder of it for the matching?

MR. SHARPLESS: Yes, if that put it into an entire financial cost complex, because as I say this is just one item; but we will do the best we can. That's the only assurance that I can give you.

MR. STEIN: Are there any other comments?

MR. O'CONNELL: Yes. Perhaps you don't have the specifics here, but possibly your staff could fill us in. What is included in the first phase of the Honouliuli system?

MR. SHARPLESS: To answer your question in 2 parts: one, I can't give it to you, but I don't know whether anybody here can or not. Francis, can you provide that?

FRANCIS AIONA (Head of the Sewage Division): In answer to your question, the first phase would include a treatment plant at Honouliuli, possibly an interceptor line from the Sewage Division to that line. We propose that a secondary plant be built and the effluent be used for irrigation in the area makai. It would also include in that time phase the necessary line to the Ewa area.

MR. O'CONNELL: Would this also possibly provide for the Navy facility at Iroquois Point and Barbers Point?

MR. AIONA: Well, I mentioned the 3-year program does include lines down in the Ewa area as far as Iroquois

Point. It would mean, however, that the Navy, or in combination with the city, could provide a lead line to that portion.

MR. O'CONNELL: Then it would not include anything, as you envision it, like an ocean outfall?

MR. AIONA: Well, according to the original recommendation, we were going to use as much as we can for irrigation purposes.

MR. O'CONNELL: And you think that you could use it totally, so that you wouldn't need an ocean outfall at certain times of the year?

MR. AIONA: This was our feeling, and we were also going to look into the possibility of either a reservoir storage or groundwater recharging in the area down below Farrington High School.

MR. O'CONNELL: What was the size of the treatment plant beginning in the first phase?

MR. AIONA: I think that it was designed for 13 million gallons per day.

MR. O'CONNELL: Now there's another area that has been mentioned. I think it's referred to as the Central Oahu area; it's the Waipio watershed area. What are the plans for that area?

MR. AIONA: Well, we had hoped that we would be able to use that water to come down a ditch, identified as the Waiahole Ditch, because of the water supply in terms of virus contamination of the water supply, plus the additional increase of solids. Now there is a study that will be very shortly under way by the Board of Water Supply and the University to determine just how great the problem might be; so as a result of that, we will have to hold off on that.

MR. O'CONNELL: Then you don't have a timetable laid out for the construction work necessary to prevent these effluents from reaching Pearl Harbor at this time?

MR. AIONA: No -- I guess the answer would be, yes, we do not have. It is my understanding that the University requires 3 years; we're hoping that we'll have the results in a shorter period than that period for us to move forward.

MR. O'CONNELL: If we're talking about the elimination of all of the effluent reaching the Class AA waters of West Loch, is it conceivable that the schedule could be laid out for this area and to meet it within the 3-year period?

MR. AIONA: Well, this is one of the things that the city along with the Governor's Task Force is attempting to do.

MR. O'CONNELL: Another question I have, related to the dump. As I understand it, it is intended that the combustibles would be discontinued within 90 days, but its use for noncombustibles would continue indefinitely, and that some measures would be taken that are appropriate to eliminate the leakage from the dump. Is that the present plan?

MR. AIONA: I think that I will have to refer this to the "Dirty Water Corps."

MR. STEIN: This is Jim Dubey of the Refuse Department.

MR. DUBEY: Yes, sir. We have plans that we had started previously for the construction of barriers around the toe of the dump, and we're also actively engaged in the removal of combustible material from the dump site.

MR. O'CONNELL: Do you have some thoughts in regard to leakage?

MR. DUBEY: Yes.

MR. O'CONNELL: What is the time schedule that you expect to follow on those?

MR. DUBEY: There was a question of money involved. It's usually money that is involved. The plans have been made by the chief engineer. They will be moving a lot faster after this conference.

MR. O'CONNELL: As far as the work is concerned, is this something that could be done within months or a year?

MR. STEIN: You know, it might be helpful if you give us a suggestion. I wouldn't be surprised if you could come up with a time schedule for us. And it might be a pretty good idea if we could get some idea of the way you were doing it.

Just think about it. You don't have to do this right now, but -- I don't want an off the cuff observation. If you can come up with something reasonable, you could help the conferees in regard to the leakage and everything. In other words, we're going to -- the purpose of these questions is to try to help the conferees; and your judgment is that the conferees are going to come up with a recommendation that you stop the leakage from the dump. We also hope that with your judgment, we might come up with a concept that might be very helpful if you could give us what you think is reasonable; because otherwise, you might be faced with a time schedule that the conferees might give you.

Now you may not want to do this right away. You may want to think about it, but Mr. O'Connell indicated that maybe 4 to 6 months might be a reasonable time. Would 6 months be a reasonable time?

MR. DUBEY: I think 6 months would be a reasonable time.

MR. O'CONNELL: I have a question in one other area related to erosion from urban development of city-controlled projects. I understand that consideration is being given to amending grade ordinances and conditioning grade permits some way so that they would provide for erosion control. Could you tell us how that stands?

MR. DUBEY: My recollection is that a lot of the background work has already been done. Whether it's before the council, or in the council committee, or whether they're just about to introduce it to the council I'm just not certain, but they are well along as far as that phase of it is concerned.

MR. STEIN: I think this is a very excellent statement, Mr. Sharpless. As a matter of fact, with the presentation of the Federal Government and the State, and now listening to you, I think that we can see daylight in terms of time schedule and finance. Not that there aren't many pitfalls. But we can see that there is one major aspect to this because it seems to be completely tied to it. That is, if we're going to provide financing, perhaps let's make this assumption that whatever any of the representatives say might come to pass through State legislation and prefinancing, as we generally call it, and if we're going to come up with a 3-year time schedule -- it still remains what we're going to do with that 3 years. Maybe we are going to have to grapple with this: 1), precisely what area and how much weight is going to be connected to the system and the work that we are going to do during this period (the 3-year period), and 2) very significantly, what kind of treatment it's going to receive when it gets to that system at the end of 3 years -- whether it is just going to be piped to the ocean, whether it's going to be primary and piped to the ocean, or whether it's going to be secondary and piped to the ocean, and whether it's going to be cholorinated.

These are not only very important from the kind of results that we're going to achieve, but I think that they are very important for the kind of money that you're going to need within the 3 years. I think that is just a little far out. You just can't move with the project just in terms of time schedule and financing. First, we have to know what we're going to do.

MR. SHARPLESS: I can have our people prepare that information for you; namely, the waste that is going to be involved and the treatment to be given to those wastes, and provide it to you.

MR. STEIN: I think that would be appropriate if we could get that within the next day. This would be very helpful for the conferees in coming up with a recommendation and conclusion.

MR. SHARPLESS: I will comply with your suggestion.* Thank you very much.

MR. STEIN: You have made a very good contribution. Thank you.

MR. O'CONNELL: At this time, we will call on the Navy to make their presentation. I understand that Admiral Hayward is here.

ADMIRAL HAYWARD: I would like to have just a few minutes to set up a couple props that we have.

MR. STEIN: We will have a five minute recess.

(RECESS)

MR. STEIN: May we now have the Navy's presentation?

STATEMENT OF

REAR ADMIRAL THOMAS B. HAYWARD, U.S.N.

COMMANDANT, FOURTEENTH NAVAL DISTRICT

U. S. NAVAL BASE

PEARL HARBOR, HAWAII

ADMIRAL HAYWARD: It is with the greatest pleasure I appear before you today to present the Navy's position on your most worthy goal to assist us in cleaning up the waters of Pearl Harbor.

The pleasure is a twofold one, for it gives me the opportunity to display for you some of our past achievements in promoting that cleanup and, more importantly, to unfold for you the ambitions we share with you to insure that the processes of environmental control in the harbor and its vicinity continue. and hopefully even accelerate.

I must emphasize that word "share," for this is a sharing program that we have been developing throughout these past few months.

The chairman must have said to you that I shared to some degree the apprehensions of others over the convening of this conference. I believed, as I still believe, that a new era of cooperativeness, coordination, and resource sharing has recently been created here in Oahu, and that that era deserved an opportunity to mature in sober, deliberative, shared problem-solving before the intervention of your Federal Agency should be requested to mediate our differences if any remained.

But I now welcome your appearance; not because mediation is required, but because your advent forged even closer bonds between the various Federal, State, municipal, and private organizations who are sharing the creativity of this new era as we prepared ourselves for this occasion.

Let me not deceive you that all this atmosphere of cooperation is entirely new, however. The Navy for many years has pressed forward to integrate itself into the life and needs of Hawaiian society. And well we should, since we, too, are concerned citizens, prudent taxpayers, and whether transient or life-long residents, devotees of Hawaiian life styles and ideals. Examples of our integration are legion, but to name a few:

Scarcely half our eligible Navy familes are housed in Navy quarters; the remainder reside in Oahu cities and communities, and more would do so if more community support were available.

Our children attend Oahu schools, and sizeable Federal grants are made each year to this fine school system in recognition of the sometimes tax-free status of our Navy members, whether uniformed or not.

We shop in civilian stores, we ride civilian buses, we enjoy civilian beaches, theatres, restaurants, cultural exhibits and most importantly, we enjoy our civilian friends.

In short, we are part of this State we live in.

In recognition of our place in this community we work to improve its stability, economy, and well-being. A few examples of our exertions are:

Our almost complete conversion to commercial electric power and our firm intention soon to be totally dependent upon that source in the Naval base complex.

Similarly with telephones; we hope shortly to become customers rather than producers.

We have for some time now been connected to the city's sewage treatment plant at Pearl City for disposal of our wastes from the mauka regions of the harbor, and we are cooperating fully in the development of an Ewa plant that will eliminate almost all sanitary waste discharges into the harbor's waters.

We have returned numerous acres of land to State, municipality, and private ownership as the Nation's defense posture has permitted and we continuously reexamine ourselves to see what more if any can be released.

We rigorously follow a policy of outleasing those lands required only for the protection of the public from the military hazards of accidental explosions and electromatic emissions, so that they may be put to beneficial use without endangering the public safety.

Our endeavors to accomodate to needed easements for highways, airports, schools, churches, and electric power and other utility lines, have been extreme. I might add that we do not sit in judgment on the requirements.

Again, in short, we try to be more than good neighbors; we are integral parts of this vital society, and we intend to continue in pursuit of this goal.

Mr. Chairman, I would now like to ask you to indulge me about 15 minutes of your time while I show pictorially what we have been doing in the area of your principal interest -- abatement of pollution, management of the environment, and conversion of Pearl Harbor to the "shrine-like" atmosphere that befits a place of such historic significance.

(Slides are shown and narrated. The showing of the slides is prefaced by music by the Navy band.)

NARRATION

Introduction

This is Honolulu, Hawaii, 1971; a modern, lovely, and fast-growing village.

Things haven't always been as they are today. Although no one was around to see it, this is what Hawaii probably looked like a million years ago.

Even 100 years ago, Honolulu was quite a different place than it is today. Things have certainly changed a lot, haven't they?

Not only is our environment constantly changing, but it's growing faster and faster. Here's what Pearl Harbor looked like 70 years ago.

Today this sleepy, little bay that you saw a moment ago is the bustling home of the mighty Pacific Fleet. Over 150 ships and 26,000 men are based here, supporting the Navy's mission to preserve peace throughout the Pacific. In another sense, the change has brought many good things to us here in Oahu.

For example, we enjoy better housing than did our ancestors and better clothing. Change has brought about a better, safer, and more comfortable life for us all. But changes also create many problems, like pollution.

All of us in Hawaii share this problem, military and civilian alike; and most of us have just begun to realize its seriousness. But we in the Navy have been searching and doing something about the pollution for quite awhile; since 1958, in fact, when the Navy first got together with the State officials to develop a program to help keep Pearl Harbor clean.

Recently, the Navy has begun to step up its efforts and is working closely with the rest of the community to find a solution to the many kinds of pollution problems that face us -- problems like the deterioration of Pearl Harbor's once-crystalline waters; soil erosion from the Pearl Harbor Basin watershed area; disposal of the mountains of garbage that we throw away each day; increasing air pollution from the growing population and automobiles in Hawaii.

The Navy is making great efforts to find solutions to these and other pollution problems in Hawaii; and the man who is in charge of these efforts is the Commandant of the

ADMIRAL THOMAS B. HAYWARD

ADMIRAL HAYWARD: It is my responsibility to see that the Navy lives up to its pollution cleanup goals in Hawaii.

Our Commander-in-Chief, President Nixon, has said that he wants all Federal Agencies, including the Navy, to move and move fast on environmental problems. Public Law 91-190 known as the "National Environmental Policy Act of 1969" establishes national policy for the environment. This law along with Executive Order 11514 clearly outlines our responsibilities in the areas of air pollution, water pollution, noise abatement, solid waste disposal, and preservation of our scenic areas and wildlife.

To insure that the Navy in Hawaii meets these goals, I have appointed a standing Ad Hoc Committee on Pollution Control, composed of representatives from the major naval commands on the Island of Oahu. With their help, I intend to see that the Navy in Hawaii continues to move effectively to preserve and improve our environment.

One of the first results of the Ad Hoc Committee's efforts is the Pearl Harbor Pollution Model Study. This study represents the first real effort by the Navy, or by any other governmental agency, to look at Pearl Harbor as an ecological system -- a system that includes the entire Pearl Harbor drainage basin, a vast area that encompasses almost 1/4 the total land area of Oahu.

Many private companies and individuals use this basin and contribute pollution to its streams -- pollution which ultimately reflects on the Navy, because the tributary streams all flow into Pearl Harbor.

The job of cleaning up Pearl Harbor and keeping it clean is a big one, and the Navy won't be able to do it all alone. But we are actively doing what we can by ourselves, and, at the same time, we are cooperating fully with all levels of government and with private industry to complete the job.

The model study has been utilized as source data by the Federal Environmental Protection Agency and the President's Water Pollution Control Advisory Council. It also provided the impetus for creation of the State Blue Ribbon Task Force on Pearl Harbor, appointed by Governor Burns in July 1971.

The model study represents just one of the ways the Navy in Hawaii has taken the lead in getting action on the vital issue of environmental preservation. The work is by no means finished yet. Still, the Navy is proud of how much it has already accomplished. Let's look at just how far we have come and where we intend to go.

Perhaps the biggest ecological problem the Navy faces is the contamination of Pearl Harbor from sewage wastes. To combat this pollution, the Navy is spending over $13 million on a long-term construction program for sewage collection and treatment.

This new, tri-service sewage treatment plant at Bishop's Point near the mouth of Pearl Harbor is part of the first construction increment, which was completed by the Navy in 1970 at a cost of $4.5 million. It can provide secondary treatment for up to 7 million gallons per day of raw sewage.

Similar treatment plants are either completed or under construction at several additional locations on the island. When this sewage abatement program is completed in early 1972, all sewage generated by Navy shore facilities in Hawaii will receive at least primary treatment, and over 80 percent will receive thorough secondary treatment as well.

Another related problem is the sewage generated by ships in Pearl Harbor. The Navy is working hard on this one, too. We have had a $250 million Navy-wide development program under way since 1965 to find a satisfactory solution.

All new Navy ships, such as these soon-to-be-built 963-class destroyers, will have storage tanks to hold human waste while traversing inshore waters, and piping connections to permit waste discharges directly into the shoreside sewage system while at pierside. Older ships will have their plumbing systems modified when they undergo overhaul.

These steps will halt the Navy's sewage contamination of Pearl Harbor, but alone they won't correct the whole problem. About 3 million gallons of untreated sewage from the residential areas of Waipahu, and mill wastes from the Oahu Sugar Company still discharge into the West Loch of Pearl Harbor each day.

The city of Honolulu, with the active encouragement and support of the Navy, is planning to build a secondary treatment plant in the Honouliuli/Waipahu district to handle this waste. Primarily treated sewage generated by the Barbers Point Naval Air Station and nearby Navy housing will also tie into the city system. The new plant will eventually eliminate all direct sewage discharges into Pearl Harbor.

Oil pollution is another problem the Navy is working to eliminate. Pumping of ships bilges into Pearl Harbor is now strictly prohibited. Floating tanks like this one, called "donuts," collect oily waste from ships and deposit it into portable shoreside storage tanks. When filled, the tank is transported to an oil-water separator where the oil is retrieved from the water and recycled. Most of it is reused in the 2 electrical powerplants operated by the Navy at Pearl Harbor.

To handle accidental oil spills, the Navy has prepared an Emergency Oil Spill Contingency Plan. As part of this plan, the Naval Station maintains daily boat patrols of the harbor to spot oil slicks. The Coast Guard assists with a daily helicopter overflight of the harbor.

To handle small spills, as well as to collect miscellaneous debris and trash from harbor waters, the Navy maintains this strange-looking craft, which bears the unlady-like name of "Juicy Lucy." Lucy keeps busy 8 hours a day, 5 days a week, helping to keep the harbor waters free from contamination.

Another serious form of water pollution is the tons of silt which each year wash down Oahu's many streams into Pearl Harbor and Kaneohe Bay. Most of the silt comes from 2 sources: highway and urban construction on surrounding hillsides, and runoff from sugar cane field irrigation.

Siltation smothers marine life, and makes it necessary to dredge the bottom periodically -- an expensive process. Disposal of the dredge spoils poses another problem. The Navy has encouraged both the State and private industry to find ways of reducing siltation, and has pushed hard for funding to permit more thorough studies by the Federal Soil Conservation Service.

Water pollution is not just one problem, but several. One thing common to each of them is the need for more facts and more hard data. To provide this, the Navy's Civil Engineering Laboratory is conducting a long-term program of pollution measurement in Pearl Harbor. The Navy hopes that this program, called "Data Base," will provide the knowledge necessary to find long-term solutions to our pollution problems.

Air pollution poses an equally complex problem. Here too, the Navy is working hard to find solutions. In late 1972, the Navy will stop burning black oil and will switch to cleaner burning, low-sulphur, distillate fuel. After that, sights such as this one will be only a memory.

Combustion and smoke emission control devices have been installed on the Navy's 2 powerplants at Pearl Harbor, and both now meet State and Federal air quality standards. The plants will eventually be phased out, as the Navy switches over to civilian power sources.

Sandblasting to remove corrosion is a necessary part of shipyard work. But uncontrolled, the area of operations can look like this. Many tons of sand are used this way every year, and much of it used to be discharged into the air.

Enclosed bins like this one are now used to contain sand. Higher quality abrasives are also employed, and where possible, high pressure water blasting is used in place of sand.

Of course, the major source of air pollution in Hawaii is the thousands of trucks and automobiles operating daily. The Navy can't do too much about most of them, but we are converting our own vehicles to the use of low-lead gasoline. Liquid propane gas is also being considered as an alternate fuel source.

Another source of air pollution is the Fleet Fire Fighting School near Aiea. Blazing infernos like this one used to be created there several times a week. The school is now closed temporarily while the Navy develops a solution to this problem.

The school provides a useful service to the community as well as to the Navy. Through cooperative training agreements, many city and county fire fighters train there. In addition, Navy fire fighters trained at the school answered over 460 civilian fire alarms during 1970.

The school is of great importance to the Navy, because fires are especially dangerous aboard ship, and realistic training is vital to prepare sailors to handle the real thing, if and when it strikes. More than $2 million have been allocated to provide the school with a smoke containment and exhaust system. This system will enable the school to resume operations without polluting the atmosphere.

This strange-looking structure is an old wood-shaving incinerator used for many years to dispose of wood wastes in the Pearl Harbor Shipyard. It will be replaced in 1972 by a new collection and storage system that will eliminate burning.

The Navy faces another big problem in the disposal of classified materials. Many tons of classified waste are burned each year at Pearl Harbor. The Navy has funded $400,000 to control smoke emission from incinerators such as this one. We are also studying the possibility of a paper mulching device which would eliminate the need for burning altogether.

Open-air burning used to be the standard method of solid waste disposal in Hawaii. The Navy ended this practice back in 1965 with the establishment of a sanitary landfill project on the Pearl City Peninsula.

Open air refuse burning is now a thing of the past for the Navy. This Pearl City landfill serves all 3 services in the Pearl Harbor area. Similar but smaller landfills are in operation at Barbers Point, Kaneohe, and at the Navy Ammunition Depot in Lualualei.

Besides reducing air pollution, the sanitary landfill is an important means of reclaiming marginal lands for more productive uses in the future. Proper land use and master planning for the Pearl Harbor region, including wildlife sanctuaries, are key Navy concerns.

This attractive Navy housing project at McGrew Point along the edge of East Loch is a good example of the Navy's concern for planning. This area, which used to be an eyesore along the Harbor shoreline, was developed and built around an historic Hawaiian fishpond, which was left unspoiled.

Another example is Pearl City Park, which is situated on land that was donated for community use by the Navy. Several public schools, the Halawa low-income housing development, a city and county golf course, and the Leeward Community College are also located on land provided to the State by the Navy.

At the same time that the Navy encourages planned development of the Pearl Harbor area, we recognize the need to preserve the natural environment required by indigenous Hawaiian wildlife. This pond on the Pearl City Peninsula is an important breeding area for several rare bird species.

Several hundred acres around the periphery of Pearl Harbor have been dedicated to wildlife conservation by the Navy. These areas may be expanded in the future to provide homes for endangered species presently nesting and feeding in sites that will be destroyed by State's proposed reef runway.

This area near Kaneohe Marine Corps Air Station is part of some 800 acres of marsh land established by the Navy on the windward side of Oahu as a conservation area.

Two hundred years ago there were more than 70 species of birds and mammals unique to the Hawaiian Islands. Today, 23 of these species are extinct, and most of the rest are threatened. Through the protection of areas such as these ancient Nuupia ponds, the Navy hopes to help reverse this sad trend.

One of the many creatures harbored in Navy conservation areas is the beautiful Hawaiian Stilt. Once abundant in Hawaii, only about 1,200 of these rare birds still exist.

In another field of conservation, the Navy has participated for several years with the United States Forest Service in reforestation experiments in the Lualualei Valley. A typical product of the work there is this Asian teak plant, which has grown almost 4 feet in only 10 months, far surpassing the normal growth rate in its native habitat.

The Navy has also taken progressive steps in the recycling of wastes. At the Kaneohe Marine Corps Air Station, up to 25 percent of the secondarily treated sewage effluent is used for irrigating and fertilizing the station's golf course.

At the Navy-Marine Golf Course at Pearl Harbor, dewatered sludge and pulp from a chemical waste paper mulcher are mixed with topsoil to provide a richer soil mixture.

Not the least of the Navy's concerns is the visual pollution of Pearl Harbor. In April 1971, a permanent Pearl Harbor Housekeeping and Cleanup Task Force was established. In a concerted shoreline cleanup campaign, major visual improvements were made, and dozens of truckloads of debris were removed.

Many larger scale cleanup jobs are planned for the future, such as the removal of this old, half-sunken ferry in West Loch. The Pearl Harbor shoreline stretches for more than 35 miles, and the ultimate long-range cost of this cleanup program may exceed $5 million.

The removal of the piles of trash and junk vehicles which are continually being dumped on Navy land is a problem that the Navy shares with city and county of Honolulu.

Although security police remove more than 30 abandoned cars every month, it is difficult just to keep up with the rate of increase. New ideas and methods of disposal are being considered, such as the placement of abandoned vehicles in offshore waters to serve as fish sanctuaries and breeding areas.

What you have seen so far doesn't tell the whole story of the Navy's pollution control efforts by a long way. The preservation of our environment is not a simple, one-shot job -- it is a complex, long-term concern that will continue to be a major planning consideration for a long time to come.

Eventually, the Navy hopes to turn Pearl Harbor into a model for other communities to follow. We want to make it a place of beauty that can be enjoyed by the entire community, with parks, marinas, and other leisure time facilities bordering its shorelines. We know there's still a long road ahead, but we feel we've already got a pretty good headstart.

We who live in Hawaii are very lucky. The beauty of our Islands far surpasses most areas of the mainland. We are just beginning to face the severe problems of overcrowding and pollution which plague many States. As an important citizen in Hawaii, the Navy is giving high priority to keeping things this way, and to making life here even better in the future.

Pollution cleanup is the responsibility of every citizen of this great country. We in the Navy have joined with State and city government officals and Hawaiian citizens to tackle this problem as a joint effort.

(End of narration and slides.)

(The above-mentioned slides are on file at Hq, EPA, Washington, D. C. and Region IX, San Francisco, California.)

My purpose in showing this slide presentation is obvious: it is to demonstrate the Navy's activities in curing those environmental problems directly within its purview. Those activities are continuing, but alone they are incomplete.

As you saw, the drainage basin feeding Pearl Harbor comprises more than 20 percent of Oahu's land mass, and although the Navy's contribution to the harbor's pollution numbers roughly half of the currently identified sources, the figure is only one of quantity. We believe that qualitatively the Navy's contribution is probably now less than 10 percent.

It was to this end that the Pearl Harbor pollution model study was undertaken. It, together with the appointment of an Ad Hoc Committee on Pearl Harbor

Pollution and the simultaneous commissioning of a permanent housekeeping task force was intended to identify as precisely as time and funds permitted, all evident sources of pollution contributing to the degradation of the harbor.

The study's results confirmed our suspicions that the Navy's responsibilities covered but one segment of the total Pearl Harbor pollution problem. A coordinated, comprehensive corrective effort involving all military, commercial, local government and private pollution contributors was patently the only way to insure that the environment be restored to a condition benefiting the surrounding military/civilian community.

Numbers of important events have sprung from this modest data collection beginning:

Gratifying support has been forthcoming from the various Federal Agencies who share in our responsibilities.

Civilian commercial/industrial interests have responded quickly to many of our suggestions for implementing improvements.

State and local officials have been enthusiastic in reacting to our recommendations for turning Pearl Harbor into a model environment for all to enjoy and admire, and for other civilian/military communities to emulate.

A Navy-sponsored data base program for

environmental quality monitoring has been established. It is serving as the bench-mark against which we measure qualitatively our own pollution and our progress in its correction and management, as well as defining the ratio between our contributions and those of others. The information so assembled will, of course, be available to all.

Thus it was that this era of cooperation gained renewed viability.

Perhaps the most important consequence of all our joint efforts was Governor Burn's appointment of a Blue Ribbon Task Force on Pearl Harbor to involve all agencies, concerns, and civic action groups who could best represent the interests of our communities in the immense task of managing our problems.

In the Task Force's 3 short months of life we have successfully continued our identification and quantification of our problems; we have developed joint solutions for rapid corrective actions; and we have found a forum in which interfaces can be defined, lead responsibilities can be assigned, and planning, programming, and budgeting information can be shared.

Some examples of our accomplishments are these:

We have compiled a demonstration program matrix showing functional areas of need, the agency or agencies involved in satisfaction of those needs, and a time-phased estimate of costs expected to achieve that satisfaction. The matrix was introduced to you yesterday by Dr. Marland.

We have dispatched 3 Task Force members to Washington, D. C. the first of this month to offer the headquarters of the involved agencies the matrix' information for their own budget preparation. That the members were unsuccessful in their primary purpose of persuading EPA to accept "lead agency" status and to request a single appropriation for the one-time correction of all Pearl Harbor's ills under this demonstration program has already been revealed to you.

We jointly note with pride the singular success of the Navy in attaining expansion of its modest Fiscal Year 1973 program for pollution abatement to one more nearly matching its needs, about $9 million. That success would probably not have occurred without the wise guidance and counsel of Mr. Freeman, Mr. De Falco, and Dr. Marland in preparing the program's justification in terms of Federal antipollution guidelines.

Continuing with my examples of the Task Force coordinated attack on pollution in Pearl Harbor: There is the recently adopted Task Force resolution calling for accelerated construction of the city's Ewa sewage collection and treatment facilities, which when implemented, relieves the Navy of the need to remodel its Iroquois and Barbers Point plants at a cost in excess of $6 million and permits that cost avoidance to be passed on to the city in one form or another. To assist in shortening the time for that system's completion, the Navy has offered a parcel of land at Barbers Point for the treatment plant's location and has volunteered to intervene with appropriate State agencies to provide pipeline space in a Navy-granted easement now being negotiated for other purposes. It is calculated that the time saved from normal land and easement acquisition measures, should the city accept this offer, will exceed 1 year.

More recently, through the medium of the Task Force, the Navy and the city have entered into meaningful discussions on the city's solid waste disposal programs, leading hopefully to the Navy's becoming a city customer, again demonstrating our adherence to the Federal policy to use municipal waste systems whenever possible.

These few examples of the many that could be cited serve to show the degree of cooperation that is being attained.

However, our endeavors so far must be exceeded. This spirit of cooperativeness is gaining in momentum, but problems still exist.

To name a few of interest to you and on which we are working jointly:

The Navy's properties on Waipio Peninsula, now outleased for agricultural purposes only (because of their location within explosives hazard distances) could be withdrawn from further leasing and permitted to lie fallow; this diversion from cultivated, irrigated, agricultural use would undoubtedly reduce markedly the influx of silted and contaminated water that now escapes into the harbor. Because of the demonstrated cooperativeness of the cane growers to pursue quickly all practicable means to contain the current runoff and to retain the waterborne silt, as well as to prolong the life of this essential ingredient in Oahu's economy, I do not now propose such a drastic measure.

Although it is within my power not to renew a license -- already expired -- for the city to operate a sanitary landfill on Navy-owned lands on Waipio Peninsula, I do not intend to follow such a course. This, based upon the city's assurances and our spirit of cooperativeness, that only noncombustibles will be permitted there after another 90 days, and conditioned upon the construction within 6 months of an impenetrable barrier to prevent leaching from the materials already deposited in the site.

The Navy will support the city's and the State's construction of drainage structures as required for stream realignment and diversions at their entrances to Pearl Harbor, so long as adequate trash barriers and settling basins are designed into the new facilities. In our joint and cooperative estimation, of course, it would be preferable for open space along the stream beds to be created and for properly engineered, un-concreted swales and terraces to be constructed instead of the lined ditches now dictated by available land.

Much has been said before this conference about the construction of oxidation ponds for sewage treatment on Waipio Peninsula. I do not question the integrity of the responsible engineers; neither do I impugn the adequacy of their designs. I know that oxidation ponds, if properly designed and constructed and if correctly and safely operated, are acceptable methods for sewage treatment and disposal. The Navy has endorsed this particular facility in the spirit of cooperativeness now prevailing between all the interested agencies. Nevertheless, in this time and at this place, oxidation ponds can only be tolerated as an interim measure designed to divert raw sewage from Class AA waters into lower classified waters at more acceptable levels of effluent quality. And the Navy and the city jointly are working to accelerate the construction of a permanent sewage treatment plant in the Ewa District precisely for this reason: to make the ponds serve only for a very short, interim period.

In connection with this Ewa District scheme, I am delighted to hear from Dr. Marland that Governor Burns intends to offer legislation designed to permit prefinancing for the various sewerage systems. This accords completely with the Navy's, and the Ewa District's citizens' desires to see Honouliuli elevated in priority to a more reasonable time frame. Nevertheless, although I applaud the Governor's decision, I view the development with cautious optimism. I have observed proposals for bond issues before, and it has seemed to me an interminable process to conduct the audits, project the revenues, prepare the prospectus, find the underwriters, test the markets, print the bonds, and finally to issue and sell the certificates. To this process must be added in this instance the necessary legislative authority. Thus I fear that the timetable for completion of the system by the end of December 1974 may still be in jeopardy. Accordingly, I suggest that the city hasten its decision on plant site and collector alignment and that final designs be commenced at once.

Turning now to a problem the Navy must solve itself, although when solved the solution will have application to all segments of the maritime industry. The problem is that of shipboard waste disposal. As you learned earlier from the slide presentation, the Navy has had vast and expensive research and development programs under way for years on this complex subject. Imperfect answers have so far resulted. Nevertheless, the Navy recognizes it cannot wait forever until perfection is achieved. I am pleased to report, therefore, that I have been directed to prepare projects for the construction of pier-side collection lines for most shipboard wastes and that the first increment -- that for the submarine base -- is in the Navy's Fiscal Year 1973 program, while the remaining piers will be sponsored in the FY74 program. Simultaneously, those ships so configured as to permit the alteration will be fitted with holding tanks and those not so configured will, at a minimum, have couplings installed so that their flushing systems can be directly attached to the pier-side lines. As you have seen in the slide presentation, new construction ships will have holding tanks, and in many instances their own integral treatment and disposal systems.

The disposition of oily wastes continues under study. The President has directed that no such wastes be discharged into other than collection systems by the middle of this decade. Intensive research on this subject is being performed in Washington. In the interim, however, I have long had in effect a carefully disciplined policy that no oils, ballasts, or bilge wastes may be discharged within Pearl Harbor's waters. So in this instance we can report nearly zero pollution from that source.

In the case of ships' sanitary wastes, studies indicate that less than 7 percent by volume of such pollution in Pearl Harbor emanates from that source. Less than 9 percent of all discharges into the harbor comes from ships; and stream and spring in-flows are discounted from the total volume.

Another problem that impacts immensely upon our goals is that of visual pollution, and this one is not within the Navy's power to correct. Neither probably should it be, for its effects are negligible upon our military mission. We feel it important, however, that corrective measures be vigorously pursued, since that particular pollutant ranks almost with sanitation in depriving Pearl Harbor of its shrine-like quality and its visitors of its beauty.

The pollution is a result of the debris that remained abandoned in the hurry-up demobilization days following World War II. It occurred as a consequence of a war fought by all free nations and of the military needs of all the citizens-in-uniform who depended on Pearl Harbor as a base. It has in intervening years, unfortunately, been compounded by the thoughtless citizens who use our shorelines as a public dump.

I have no particular suggestions on how best to obtain the $5 million we estimate is needed to accomplish its removal. But it seems a small price to pay in our total scheme of things.

Now that total scheme is this:

Since December 7, 1941, Pearl Harbor has been a monument to American resolve, resiliency, and patriotism; much as are Lexington, Concord, Valley Forge and Gettysburg in the hearts of all of us. We cannot permit Pearl Harbor to dissolve and decay through our neglect or misuse.

It must be restored to dignity, prestige, and beauty for the enjoyment and reverence of all people who remember its famous name.

If our efforts are supported at all levels of government and by the wills of all the citizens who care, that restoration can be accomplished -- I think within 3 years.

Mr. Chairman, I submit for the record two documents: one, the Pearl Harbor model study and the second, our estimate of our program needs by line item for the next 3 years.

Thank you.

(The above-mentioned documents follow.)

NAVY POLLUTION ABATEMENT PROGRAM, PEARL HARBOR REGION

DESCRIPTION	EST. COST	FY PROG	PRESENT PROBLEM	STATUS
Fuel-Water Separator	$121,000	72	Small, inadequate gravity separator currently in use to provide fuel oil removal from wastewaters before wastewater discharged into Middle Loch, Pearl Harbor. Project will provide greatly improved separation facility	Authorized by Congress. Awaiting appropriation bill.
Volatile Waste Incinerator	101,000	72	Presently the only safe means of disposing of volatile wastes, such as methyl ethyl keytone, is by open burning at Pearl City Peninsula Sanitary Landfill. New project will provide incineration capable of compliance with Federal and State emission standards.	Authorized by Congress. Awaiting appropriation bill.
Sawdust disposal Improvement	76,000	72	Present means of disposal by burning. Project will eliminate burning & residue will be hauled to sanitary fill site.	Authorized by Congress. Awaiting appropriation bill.
Classified Waste Incinerators (Various locations) 3 separate projects	491,000	71 & 72	Present incinerators for disposal of classified wastes do not meet State and Federal Air Emission Standards.	71 project authorized & appropriated but not yet constructed; 72 project awaiting appropriation. (Further study being conducted to determine if alternate methods of disposal are more suitable than incineration)
	$789,000	(TOTAL 72)		

DESCRIPTION	EST. COST	FY PROG	PRESENT PROGRAM	STATUS
Replacement and Relocation of POL Lines (NAVBASE PEARL)	$3,273,000	73	Many old lines suspended beneath piers and in poor condition - cause occasional leaks into Harbor. Replace & relocate on top of piers.	Being supported by Navy in FY73 program.
Oil Collection Facilities (NSC PEARL)	332,000	73	Old oil entrapped in the ground in the Pearl Harbor area, periodically seeps into Pearl Harbor.	Being supported by Navy in FY73 Program. Directed to prepare PCE.
Waste Oil Burner (NSC PEARL)	250,000	73	Storage tanks currently in use for collection of all waste oil and sludge becoming full. Tanks may have to be demolished to free land for other uses. The proposed burner will dispose of all waste oil in a manner which will comply with State & Federal Air and Water Quality Standards.	Being supported by Navy in FY73 Program. Directed to prepare PCE.
Smoke Abatement Facilities Fire Fighting School (NAVSTA PEARL)	1,932,000	73	Training in firefighting techniques results in large volumes of smoke and soot dispersed into the atmosphere - a major source of air pollution. Facilities planned will abate smoke discharge and meet requirements of State & Federal Air Quality Standards.	Being supported by Navy in FY73 Program. Two different control methods under consideration.
Pollution Abatement Ballast Tank (NSC PEARL)	96,000	73	Fixed cone roof allows evaporation of approximately 27,300 gallons of gasoline per year. New project would replace fixed roof with floating roof to control air emissions from evaporation.	Being supported by Navy in FY73 Program. Directed to prepare PCE. (Review possibility of using pressure system vice floating roof during PCE stage.)
Construct Sewer Laterals NAVSTA PEARL)	36,000	73	Chemically treated waters in boilers, air conditioning towers, and swimming pool backwash discharge untreated into storm drains which empty into Pearl Harbor. This project will eliminate discharge of these miscellaneous sources into Pearl Harbor.	Being supported by Navy in FY73 Program. Directed to prepare PCE.

DESCRIPTION	EST. COST	FY PROG	PRESENT PROBLEM	STATUS
Thermal Pollution Abatement, Power Plants 2&3 (PWC PEARL)	$1,000,000	73	Cooling water discharges from Power Plants 2 & 3 into Pearl Harbor. Project would provide a dispersing outfall.	Scope of project to be revised, taking into account the phase-out of PP#3. Clarification required on zone of mixing. Project reduction of scope & cost to $500,000 expected. To be supported by Navy FY73.
Blasting & Painting Facility (NSYD PEARL)	785,000	73	Sandblasting operations in Shipyard cause severe dust nuisance in the drydock 4 area & near HAFB housing area. Project would eliminate air pollution (dust) problem by providing enclosed working spaces.	Navy-wide problem. Seeking additional support for FY73 May be delayed for FY74.
Sewer Lateral Connections	942,000	73	Various minor building sewer laterals in Pearl Harbor as well as submarine berths are not connected to main sewage collection system. While most sources are remote & minor, varying amounts of raw sewage from these outfalls are discharged into the Harbor. Project will provide lateral connections to sewage treatment plant sewer mains.	Will be supported by Navy in FY73 Program. Directed to prepare PCE.
Wastewater Collection System Fire Fighting School, Pearl	27,000	73	Fire Fighting School temporarily shut down due to wastewater discharge into Pearl Harbor. New project an interim solution to enable limited training prior to construction of fire fighting facility Smoke Abatement Project in FY73.	Project funded in September 1971.
Repairs to Ballast Line "H" Piers	225,000	73	Deteriorated sections of old ballast line cause periodic oily waste leaks into Pearl Harbor. Project will replace old lines with new.	Will be funded by operatior & maintenance money. Expect in FY73.
TOTAL FY73	$9.0±			

CRIPTION	EST. COST	PROG	PRESENT PROBLEM	STATUS
Floating Oil & Debris Barriers	$ 55,000	73/74	Floating debris is blown under Harbor piers by tradewinds. Barriers would prevent from collecting in inacessable areas & would allow removal of the water pollutants by skimming devices.	Expect to be funded by NAVSHIPSYSCOM.
Oily waste/ Oil Spill Barge & Pickup Equip.	309,000	73/74	Additional containment & collection equipment required to support oil spill contingency plans during emergencies.	Letter request submitted to Chief of Naval Material for funding. Interim reply received. Some equipment now under procurement. Restudy of certain aspects is necessary.
Connection to City's Sewerage System - NAS BARPT & IROQUOIS PT HSG (NAS BP)	6,920,000*	FY74 Object.	Existing sewage treatment plant at NAS BARPT & adjacent Iroquois Pt Housing provide only primary treatment to sewage. Connection to City & County of Honolulu plant would eliminate the need for expanding present facilities to secondary treatment & then a later connection to City system.	Negotiations actively under way with C&C for tie-in to municipal system. Objective is FY74 program. Dependent upon timing of C&C system. Temporary waiver granted to Federal Executive Order deadline. *Expect to revise project scope & cost to on-base Navy portion - $2,800,000. Off-base Navy share to be included in "Federal" grant share.
Pearl Harbor Shoreline Cleanup (NAVBASE PEARL)	4,800,000*	Indefinite	Abandoned harbor facilities & sunken craft mostly of WWII vintage, are widely scattered around the 9 sq. mi. of water areas & 35 mi. of shoreline of the Harbor. This proposed project will provide a general cleanup of shoreline & waters in Pearl Harbor.	*Recommend Federal or combined State/Federal funding. Results will be of benefit to entire community. May withdraw from Navy program.
Oil pollution Abatement Power Plant #3 (PWC PEARL)	571,000	74	Underground oil seeps into cooling water intake & ultimately discharged into Pearl Harbor.	Further study required. Impact of FY73 subsurface oil collection project unknown.

DESCRIPTION	EST. COST	FY PROG	PRESENT PROBLEM	STATUS
Ship-to Shore Waste System (excluding SUBASE) (PWC PEARL)	$3,500,000	74	Ships discharge sanitary wastes thru many outlets directly into Harbor. (SUBASE pier collection lines included in FY73 project.)	PWC PEARL doing preliminary engineering investigation of impact impact/cost to modify shoreside treatment & collection system to accommodate.
TOTAL FY74 AND OUT YEARS	$8,000,000 +			

MR. STEIN: Thank you very much Admiral, for a very excellent presentation and statement.

During World War II, I was in the Army, not the Navy. But it seems like a different Navy than the one I knew. And I think this is evident because I don't think that we would have these problems to deal with if we were working on this for a long time. But I do think that the proposals here are made really in a spirit of cooperation, and I am indeed impressed by the detailed knowledge that you and your group have and the interest. You have certainly thought the problem through, and it is certainly very, very encouraging.

Are there any comments?

MR. O'CONNELL: I did have a number of questions, but the statement was so complete that it has directed itself to those things that I was going to bring up.

The only other thing that occurred to me was during the interim period, if there was any possibility to upgrade the performance of some of the treatment facilities that are to be abandoned, such as the one at Iroquis Point and Barbers Point. I wonder if that has been explored at all.

ADMIRAL HAYWARD: Well, the point that is going to give that impetus -- I have pressed everyone to move on this cleaning up the Honolulu treatment plant -- is to prevent the U. S. Navy from spending at least $6 million in order to meet the dictates of the President to correct our own problems. We cannot meet the standards of Iroquois Point and Barbers Point plants if we do not spend that kind of money. We think that it's a waste of money, and it should be directed to helping the city solve their problem so that we can use the city facilities as far as possible.

MR. O'CONNELL: Well, I agree with that. I was just thinking about the interim measures and the operation and procedures of the dump pile whereby the effluent of these facilities might be improved.

ADMIRAL HAYWARD: No, I don't think they have a way of doing that. We have a primary treatment plant at all of those facilities. We cannot upgrade them without putting the effluent where it shouldn't be with money which we expect to have so that we can hook up with the city and county or the Honouliuli treatment plant.

DR. QUISENBERRY: Thank you, Admiral Hayward. You mentioned that you want to prevent the Navy from having to spend the $6 million. What's the chance of getting, for example, the $6 million plus some other money that the Navy might have, being diverted to this contract rather than the Navy having to spend it? This is what we would like to see, of course.

ADMIRAL HAYWARD: Well, we would too. We are fully in agreement with that. I don't think that we will be able to justify $6 million, but a substantial part of that would be considered. And it would be a negotiable kind of an agreement between the municipality and ourselves as to what we should do to show our willingness to try to do this. We will break out the necessary acreage on the northeast corner of Barbers Point -- call it the boundary line of this facility exchange -- to build the plant there if that's where the city wants it, and almost anything we can think of to help out.

Now that property, of course, would be made available and has a distinct dollar value to it which is not even considered in this $6 million or any other amount.

MR. STEIN: Thank you. Just one little comment. I think this one is directed at us, the EPA as well as the Navy. I live and work within the shadow of the Pentagon, and believe me if anyone thinks things have changed since we came out here, some 6,000 miles to the Pacific Basin, to hear statements and phrases such as "interfaces to be defined," "demonstration program matrix," and "time-phased estimate," one would think we never left home.

ADMIRAL HAYWARD: I just left there.

MR. STEIN: That is the magic password that shows you are a member of the club.

Thank you very much.

DR. QUISENBERRY: Mr. Chairman, with your permission, we will proceed on with the representative from the State of Hawaii. At this time, I would like to call on Dr. Doak C. Cox who is Director of the University of Hawaii Environmental Center to make his presentation.

STATEMENT OF
DR. DOAK C. COX
DIRECTOR, UNIVERSITY OF HAWAII ENVIRONMENTAL CENTER
HONOLULU, HAWAII

DR. COX: My name is Doak C. Cox. I am Director of the Environmental Center of the University of Hawaii. I am also a member of the Governor's Pearl Harbor Task Force. In addition to being a native of Hawaii and a resident here most of my life, I have been fortunate enough to indulge for more than 25 years in amateur, professional, and academic activities of a wide range related to the conservation of Hawaii's environment. I represent neither the University nor the Task Force, and the justification for my participation in this conference must rest primarily on the hope that some concepts and opinions derived from this background may be of value to you.

DR. DOAK C. COX

I first gained a measure of professional acquaintance with the pollution of Pearl Harbor 2 years ago as a participant in an extensive, but admittedly not intensive, survey of pollution in estuaries throughout the State of Hawaii supported by a predecessor of the Environmental Protection Agency, the Federal Water Pollution Control Administration. Our findings were published in "Water Resources Research Center Technical Report" 31, vol. 1, pp. 61-66, 1970.

I will scarcely mention our report further. It was apparently superseded, so far as Pearl Harbor is concerned, even before it was issued by the much more comprehensive report of the FWPCA presented this morning, which bears the date of 1969, although it was not available to us I believe until mid-1970. The only information in our report that seems to have been missed by the FWPCA (I may have overlooked it in their report) is that derived from a 1965 study by the Community Pesticide Study pertaining to pesticide residues in the water, sediments, and oysters, with analyses showing as much as 15 ppb P, P'DDT, 33 ppb DDE, and 25 ppb DDD in the oysters. I can't comment on the significance of these analyses, but I believe some of the contributing pesticides have been phased out of general use.

DR. DOAK C. COX

The results of our study were of special poignancy to me because, as a youngster in the early thirties, I had occasionally swum and sailed in Pearl Harbor as a guest of a family who had a place on the shore of Pearl City Peninsula. I had the same sort of personal gut reaction to the pollution in 1969 as was demonstrated yesterday by the representative of Save Our Surf, even though later in the thirties I had contributed to one of the activities polluting the harbor as a deck hand on a tug engaged in a dredging job in the entrance channel.

I sense that in reality this conference is not dealing alone with the specific problem of pollution in Pearl Harbor as it relates to the oyster, but the general set of problems of pollution in the harbor, and this I regard as appropriate.

I am not going to attempt an overall discussion of these problems. Mr. Freeman, in his summary of the 1969 FWPCA report and the just issued supplement, did that exceptionally well.

I think that I can contribute most usefully by picking up aspects discussed by Mr. Freeman and other witnesses heard so far on which presentation of a different slant may be valuable and aspects not discussed so far that may be significant.

DR. DOAK C. COX

If in some respects, I am critical of specific details in various proposals to abate the pollution of the harbor, I hope you will remember that this in no way reflects disagreement with the opinions of previous witnesses that a massive control effort must be mounted, that it has been too long delayed, and that in major aspects the effort that seems to be emerging is appropriate. It does reflect I suppose my concern that the plans for pollution abatement have a solid scientific, technological, economic, and political base, so that their goals can realistically be met, and they will not merely add to the sources of frustration all too plentiful in our time.

Achievement of the goals is just as much a matter of their proper selection as it is on the selection and implementation of plans to meet them. I am concerned that the goals adequately represent nonmaterial environmental considerations, conservative of esthetic and ecological values, as well as material considerations of far longer term than we usually take into account in economic analyses. I am equally concerned with priorities, recognizing that there are some aspects of pollution abatement that are important and relatively easy to achieve, others whose importance is either lower or less certain or which will be more difficult to achieve; and some whose importance seems negligible, whose achievement would be very difficult, or about which knowledge is so slight that estimates of importance or difficulty is mere speculation.

The simplest attempt at expression of immediate goals for the abatement of pollution in Pearl Harbor must be the water quality standards adopted by the State and approved by the Federal Government. I admire the thorough job that Miss Shimmin did yesterday morning in relating the water quality of Pearl Harbor to these standards, or rather in showing how disastrously unrelated the water quality is to the standards. As guides to the quality eventually to be sought, however, I am sorry to say that I regard the Hawaii standards as unsatisfactory. They were developed in 1966-1967 on the basis of a fund of ignorance in which the few kernels of knowledge were surrounded by threads of misconception. Some in this audience must be tired of my harping on the lack of knowledge as to natural background levels, current levels, current trends, sources, fates, consequences, potential controls, and consequences of potential controls of each pollutant needed before we set a standard for it. But until we have enough knowledge to amend the standards, their deficiencies must be kept in recognition.

I am not sure that our total coliform standard has any real significance in pollution control. The significance of the fecal coliform standard as an indicator of health hazard, nowhere really satisfactory, is especially doubtful in our coastal waters because of ignorance as to comparative salt water die-off rates of these organisms and human pathogens. We have no standards for such other significant microorganisms as salmonella and fecal streptococci. The nutrient tolerances in the standards are apparently exceeded in places in the open ocean by nature, and although we do not know what the natural levels were in places like Pearl Harbor, it seems doubtful that anything short of reverting to a Polynesian standard of living and population could get the levels there even to approach the present standards.

Although we have a standard for oxygen there is none for oxygen demand. The temperature standard is ambiguous and does not distinguish between bottom and surface temperatures. Standards dealing with pollution by soil particles are also ambiguous. The only numerical standards pertinent are those for turbidity. These are framed as percentage changes from natural levels, including a lower as well as an upper tolerance. I need only to refer to a reference in an ancient mele to Ewa's "aina kai ula i ka lepo," its lagoon red with dirt, to indicate that, if the natural turbidity could be quantified, this standard would prevent a real cleanup of the harbor, even if this was feasible.

Perhaps most significantly our standards relate primarily to concentrations of pollutants in the waters whereas, as was plain from Mr. Kelly's testimony, some pollutants would be better indicated by their concentrations in organisms living in the waters, or by other biological indicators. Mr. Kelly's statement, by the way, was an exceedingly thorough review of the health hazard associated with polluted shellfish, and although some of his remarks were not tied in to the Pearl Harbor situation, it is possible that their apparent lack of pertinence is the result of lack of knowledge.

In the standards, the classification of the Pearl Harbor waters also is questionable on the grounds of ambiguity and feasibility. The head of West Loch is set aside as Class AA waters, for conservation uses including the propagation of shellfish. I understand that the Pearl Harbor oysters are the reason for this classification. But fishing, perhaps including shellfishing, as distinct from fish and shellfish propagation, is a use in Class A waters, and it seems possible that commercial harvest of the oysters in West Loch might be ruled inconsistent with the AA conservation classification. In any case, it is probable that meeting the AA standards will prove quite infeasible. The rest of the harbor is explicitly placed in Class B for harbor uses by the standards, yet at the same time, as pointed out by Mr. Freeman, they state that the Class B designation in any harbor shall apply only to a limited area next to the docking facilities, the remainder being in Class A. The standards distinguish between stream and coastal waters, but a point often overlooked is that the tidal waters of stream mouths are defined as coastal waters.

A second guide to possible abatement of pollution in Pearl Harbor is available technology. Some enthusiastic but ill-informed persons would like to require universally the use of the most intensive treatment technologically available. Quite apart from the difficulty of distinguishing full-scale feasibility from laboratory feasibility, such a requirement would, in its application case by case, result in general environmental deterioration because of the inherently increased drains on natural resources and requirements for waste discharge. Furthermore, it would involve such wastes as the economically and environmentally costly separation of water from such components as nutrients which, in order to put them to use again would have to be recombined either on land or in the sea, whether in artificial agriculture or agriculture or in the promotion of natural productivity.

Our water quality standards refer at several points to the "best practicable treatment or control." An action requested of the Department of Health was recently blocked on the grounds that this phrase meant the most extreme form of treatment or control that technology had to offer whereas extremes of treatment were not employed in the case in point. I looked into this matter rather carefully and found that this meaning could not be sustained, any more than a meaning restricted to practicality on purely economic grounds. On the basis of the ordinary dictionary meanings of the words, the statutory authority back of the standards, the usage of the phrase throughout the standards, the history of the section of the standards in question, and the public responsibilities of the Director of Health, I found that this phrase must be taken in the context of the water quality standards to mean that method and extent of treatment and control which is made feasible by technology and which is best in terms of overall, long-term, public welfare.

There is clearly a place for standard solutions to problems. That place is in dealing with little problems where the cost of determining optimal solutions individually would approach or even exceed the cost of the solutions themselves. Unquestioned reliance on standard solutions to big problems, however, is a cop out; a means to avoid looking, measuring, and thinking; and a surrender to the same kind of uncritical, stereotyped, pattern-following which led so far into our present environmental morass.

I regard abatement of the pollution in Pearl Harbor as a big problem -- anything that is going to cost even millions of dollars, let alone hundreds of millions of dollars, is big in my definition because a lot of sharp looking, careful measurement, and hard thinking can be bought for a great deal less than a million dollars. We in Hawaii were terribly slow in taking our environmental problems seriously and starting the necessary looking, measuring, thinking -- and acting. At several stages we have received well-deserved nudges and prods from Federal Agencies and some good advice as well, incidentally, as some bad advice on occasion. In some respects we may still benefit from even the more disagreeable kinds of encouragement. But with respect to the abatement of pollution in Pearl Harbor, most of the elements of a sound comprehensive plan have been formulated among the several agencies concerned on the basis of the requisite hard thinking. The main functions of the Pearl Harbor Task Force, as I see them, have been to coordinate these plan elements, determine how their implementation could be expedited by pooling of needs and resources, and develop a rationale for allocation of support and strategies for its procurement. The results are what have been so effectively presented by Dr. Marland, Mr. Sharpless, and Admiral Hayward.

As you may judge, the job isn't complete yet. There are still some problems to be worked out, but there is no significant disagreement as to what should be accomplished,.only as to how it should best be accomplished in detail, and how fast.

The major concern of the Task Force has been the discharge of sewage from the communities and industrial and military facilities on the perimeter of the harbor, with various degrees of treatment into Pearl Harbor. Except as to details, such as the routing of the trunk sewer around the harbor, which seem to me of small importance, the plan which has evolved to construct the integrated Ewa sewage system with a central treatment facility and to export the effluent from the harbor seems to me eminently satisfactory. The major hangups have been those of timing, and those in turn have had a perfectly logical basis in the differing priorities of the constituencies of the various agencies concerned, the mismatch between degrees of interest of these agencies and their normal share of responsibility for support of sewage treatment facilities, and the limitations on fiscal capabilities that all agencies seem to share.

At this point I want to put in a word in defense of the city and county which has the responsibility, not only to collect and get rid of the municipal sewage that represents the major fraction of the total sewage produced in the area, but to provide the major elements of the central system through which will be disposed the sewage of the military installations as well. Since this is an enforcement conference and, as has been stated, the Federal EPA and State DOH officials are to be regarded as joint enforcers, somebody has to occupy the role of enforcee. The Navy and the city are candidates, but clearly the Navy has done an exceptionally fine job so far, and as Admiral Hayward has indicated, the excellence of the Navy's effort can be expected to continue. Thus it looks to me as if the city is most vulnerable.

As I said, I want to put in a word in its defense. There are, I think three causes for lagging performance on the city's part. One I do not condone -- procrastination, especially in getting started. The second I consider praiseworthy rather than blameworthy. Of all the agencies represented here, Federal, State, and local, civilian and military, executive, academic, industrial, and community, the city department of Public Works, which I would a couple of years ago have thought the least likely agency, has supported the most extensive, thorough, and expeditious study of the entire problem of waste disposal on this island in relation to water quality considerations. The final report of the consortium in the Oahu Water Quality Study is due shortly, and many of us have had access to preliminary data and recommendations. I would consider any criticism of the city for delays related to the conduct of this study entirely misplaced.

The third has to do with priority. In spite of my personal desire to see Pearl Harbor cleaned up, I could not personally have urged on either the city and county of Honolulu or the State of Hawaii as high a priority for the solution of the sewage problems at Sand Island and at Kaneohe. This is in a large measure because the waters of Pearl Harbor have in general not been accessible to, not useable by the Hawaiian public, but partly also because I believe that many of the deleterious ecological consequences of the harbor's pollution were accomplished a long time ago. Until yesterday I was prepared to say that if significant cost-sharing is required from the city and from the State, and if the financial capabilities of either preclude their simultaneous commitment to the solution of all three problems, it was my opinion that it would be better to delay for a year or two longer the initiation of a reversal of those consequences in Pearl Harbor than to delay, for example, the stoppage of the active spread of such consequences in Kaneohe. If the cleanup of Pearl Harbor merited a higher priority from a national standpoint, then it seemed logical to me that the Federal share of the cost should be larger than normal.

The picture has changed dramatically during this conference in two aspects. First there have been hints that Pearl Harbor may be opened up to public use in the near future, at least this is the impression I get from the emphasis on development of recreational facilities on the shores, and turning the harbor into a model environment for the use of all. Let me admit that, though I must have heard earlier some of the statements to this effect now read into the record of this conference, their message did not come through to me loud and clear, and I suspect that they may not have come through to the city officials clearly either. I do not believe the innuendo that the pollution of the harbor has been the primary reason for exclusion of the public from the waters of the harbor, but if the exclusion is to end, there is a heck of a lot more justification for substantial city and State support and priority to abate the pollution of these waters.

The other dramatic change came through the announcement by Dr. Marland that Governor Burns is going to seek from the legislature the authority that will permit the State to cut the Gordian financial knot. A considerable part of the justification of this second change rests on the first change, it seems to me. I would guess that the legislators and taxpayers of the State will be critically interested in an explicit Navy confirmation of its intent to open Pearl Harbor in some substantial way to public use, followed if possible by some actual opening, in deciding whether to allow the State to commit itself, as the Governor proposes, to a priority change with respect to Pearl Harbor cleanup.

Other hangups have concerned the means of final discharge and the degree of treatment appropriate. We are agreed that the effluents should not go back to the harbor. We would like to think that, at least in the future, we can use beneficially both the water and the nutrients in irrigation of the lowland sugar cane fields in the Ewa District. To do so we are advised the sewage should receive secondary treatment. There are problems in that the nutrients although beneficial through most of the cane growth cycle are detrimental in the ripening period, and it is not yet certain whether their dilution would be so great as to minimize the detriment, or if not whether there is adequate flexibility in the irrigation system to permit it to carry two waters of different qualities.

In any case, provision would have to be made for an alternative means of disposal of the effluent during the rainy non-irrigating season. Two alternatives appear potentially open. One is disposal at sea and the other disposal underground in an aquifer having no potential for domestic supply. We are now engaged in a trial of the latter alternative at Waimanalo, on the windward side of the island, where the geologic and hydrologic conditions are similar but where the quantity to be disposed of is smaller. Ecological results cannot be assessed, however, for several years. Depending on the location of injection there might or might not be some possibility that the injected effluent at Ewa might return to the harbor, defeating our purpose. With the ocean disposal there appears to be no detriment, so long as the diffuser is at adequate depth and adequately far from the shore. The early construction of the ocean outfall would have the collateral advantage of providing an early solution to the disposal of sewage from some systems now emptying into the harbor entrance.

The ocean outfall, however, can be considered not merely a seasonal alternative to irrigation use but also a perennial alternative. But if the effluent is to be discharged at sea continuously there is no need for more than primary treatment. Let me put the matter in a somewhat different way than Dr. Craven. The sea around us is deficient in nutrients and organic matter. No possible harm can result in supplying such materials to it except possibly in the area of high concentration immediately around the diffuser. To remove the organic matter in a sewage treatment plant requires an allocation of space on land in which the water quality is clearly not what we would like, an allocation of energy entailing a draft on fossil fuel supplies and a waste heat load to be disposed of somewhere, an allocation of construction material representing more drains on natural resources, and an allocation of human energies, all of which we can save by an allocation of a roughly similar space for assimilation in the ocean. We shouldn't discharge toxic and non-biodegradable material into the sea, but such material ought not to be permitted in the sewage in the first place.

DR. DOAK C. COX

This question is not completely settled yet. I am inclined to think that Mr. Sharpless is overly optimistic in expecting that a sensible decision can be reached before the conference is ended. The arguments may now all have been heard, but they really must be gone through again in view of the drastic change that is being made in priorities. I am personally inclined to think that the risk of ground-injected effluent getting back into the harbor, the risk of unsatisfactory near-shore ecological effects from the ground-injected effluent, and the doubts of the capacity of the irrigation system to accommodate the nutrient rich waters are sufficient to justify early construction of the ocean outfall, but that if it is constructed, secondary treatment should not be provided unless and until the irrigation use becomes feasible. The important thing is not this personal conclusion, but the complexity of the decision, and the regrettable consequences of premature and arbitrary foreclosure of the options.

Dr. Marland has mentioned the problem of the appropriate disposal of sewage from some high-altitude communities on the Schofield plateau and the slopes leading up to it. This sewage is treated so that the effluents are freed from microbiological concentrations posing possible health hazards. The effluents are now in part released to

Waikele Stream which flows to Pearl Harbor; they may also be released in the Waiahole ditch whose waters are used for irrigation. Objections have been raised to the stream discharge on the grounds that it contributes to the nutrient pollution of the harbor, and to the ditch discharge on the grounds that the nutrients would pollute the ground water by way of downward percolation of irrigation excess. Both objections seem to me greatly exaggerated. The nutrient contribution from these sources is a very small part of the total nutrient load discharged to the harbor. In the irrigation system the nutrients can simply replace the nutrients supplied by commercial fertilizers, so that they should not be considered as an increase in nutrient load to the ground water. The possibility of viral contamination of the ground water has been mentioned as a deterrent to the irrigation dispersal. Although dilution, absorption, and virocidal processes are poorly understood, and laboratory investigations do not prove how we are protected from significant viral disease transmission by way of ground water, the lack of any epidemiological evidence of viral disease resulting from many decades of use of Honolulu's ground water, recharged directly until recently from hundreds of cesspools, suggests that this concern is exaggerated.

DR. DOAK C. COX

A third option, besides putting the treated effluent into the stream or into the ditch, is to run the sewage by interceptor down to the Ewa system trunk sewer and thence to the planned major municipal treatment facility. From the pollution control standpoint this is, of course, a new ideal solution, but on general environmental as well as economic grounds it is objectionable. In this system, neither the water nor the nutrients would be put to use on land, and we can see the time coming in 25 or 30 years when we are either going to have to recycle water far more extensively than we do now, recharge our ground water bodies artificially more than we do now, or desalt ocean water to keep up with increasing demands for water. The effluent from the high-altitude treatment facilities is valuable not only because it is water but also because it has a high head, which can be replaced only by high-lift pumping entailing increased expenditures of energy with their consequences in both natural resource drains and waste heat disposal.

I don't know how this problem is going to be settled by the Task Force and the agencies its members represent. I do know that it would be most unfortunate if out of all the environmental considerations, only one, the small nutrient contribution to Pearl Harbor, were made to appear the sole consideration.

I've taken too much of your time already, but there is one more topic I'd like to discuss with you. This is the thermal pollution of the harbor. The major source, but not the only one, is the Hawaiian Electric Company's powerplant at Waiau. The Department of Health recently held a public hearing on the request of the Electric Company for a zone of mixing in East Loch to accommodate the discharge. I can comment with more than personal background on the advisability of sanctioning the continuance of the discharge because our Environmental Center presented testimony at the public hearing on the basis of a joint review by experts on water resources, engineering, and marine biology. In brief, our conclusions were, on the one hand, that the shape and size of the thermal anomaly were inadequately outlined by the Electric Company particularly for winter conditions, that the ecological effects of the discharge were entirely inadequately described, that the most reasonable alternative means of disposal of the waste heat were not discussed, and that the presence or absence of some possible deleterious components besides heat were not mentioned; but, on the other hand, that we knew of no clearly preferable alternatives to the harbor discharge of the waste heat and no deleterious effects of the discharge adequate to offset obviously the social benefits of the continued production of power. We therefore recommended the establishment of a zone of mixing for a short term during which information adequate to a sounder long-term decision might be acquired.

I must confess that the primary reason for claiming your indulgence for as long a discourse is not the hope I expressed originally that some concepts and opinions derived from my privileged and fortuitous background would be of value, as the hope that I might contribute to the development of a recognition that, in spite of Hawaii's laggard initial performance in water pollution control, some very careful planning has now been done, commitments have been made to programs environmentally sensible rather than doctrinaire, and that at this point we need more in the way of cooperative help than the jab of censure.

MR. STEIN: Thank you very much, Dr. Cox. Are there any comments or questions?

DR. QUISENBERRY: I would like to say a word on behalf of the State, Mr. Chairman, that this actually concludes the presentation by the State representatives to this conference. And we admit that we have had some problems with our water pollution regulations and water quality standards as raised by Dr. Cox. And we are amending them at the present time. Dr. Cox has contributed to these amendments, and he has reservations still, as he expressed this morning, with which we are grappling at the moment. We have no other amendments in mind at this time. We are making some progress in spite of these limitations, in spite of problems in our water quality standards, and we hope to make more -- progress, that is.

We are dedicated -- I believe all of the State agencies that have been represented here today are dedicated to the implementation of the program outlined by Dr. Marland. And this will, of course hopefully, be accomplished in the 3-year period, as he stated.

We appreciate this opportunity to present to this conference. Especially as a fellow conferee, I am grateful for being allowed to present these people, and I am sure they will be available to answer any further questions, if we have them, as the conference continues.

MR. STEIN: Thank you. You have raised one point, and I hope that everyone will appreciate that the conferees have to deal with this. I don't think that this is unique to this conference in particular or to any large-scale enterprise for manufacturing operations. The point is that you always go to the man in the laboratory or the man making the plans, and he wants 6 months more to sharpen up a criteria, and it's never answered. But there has to come a time -- if you run an automobile plant, you have to start production or you're not going to sell any automobiles. So, unless we, as administrators, take on the job of presenting and putting together a program that is going to reverse the environmental degradation, we're not going to get around to it.

Now, obviously, this is somewhat of a delicate situation of balance in judgment that the administrators have to make. This is a revelation to me, coming to Hawaii at this time. As you know, I have been here many, many times in the past. From the point of view that I have, you have thought through your problems, and we have had as sophisticated an analysis as we get anywhere in the country.

Given the present stage of knowledge, I don't know if in examining this we are going to get more sophisticated. However, there are many cautious notes which have been made about things which we unwittingly have not been entirely perceptive about, and these are things that we will have to grapple with in coming up with the program. Again, as I said, given the Navy and the State and the city and the Federal reports, the way I see it we are certainly not very, very far apart.

The essential question that I think we have to grapple with is that if we are going to come up with a program -- and I have no prior judgment on the time schedule, the 3 years, should we decide on 3 years -- we must, with precision, indicate precisely what that program is going to be and what we are going to accomplish.

This is the area in which we have not quite had as yet a clear image. Again, before we recess for lunch, let me indicate what this is.

As they always do, I think the outline of the financing and the outline of the time schedule are beginning to emerge. I am not quite sure that we have the precise effect at this point. I hope that -- we must have it before the conference adjourns or comes up with a recess -- we can decide whether we are going to have a long pipeline, short pipeline, no treatment at all, or primary treatment. On the pipeline, we should know how long it's going to be; and on secondary treatment and the pipeline, how long it's going to be; and what we're going to do about the chlorination; and what we're going to do about recycling the water.

In other words, these are the kinds of things that we are going to have to think about. If we're going to come up and ask people to spend hundreds of millions of dollars and tens of millions of dollars in a short time period, we must, with precision, tell them exactly what they're going to buy. If we don't do that, I don't think we're going to get off the ground.

I think the Admiral pointed out something -- and I noted it with dismay -- about the bond issue with all the things that you have to go through -- Admiral, I happen to be a lawyer, and that's how we make our living -- I don't think that you're going to get the bond issue sold, whether it is a bond issue or any other kind of financing, unless the people know what they're buying. You are not going to get any backing, and the financial community isn't going to endorse or pick up this financing unless they know precisely what they are going to get for their money. That is what I think we are going to have to go about.

Why don't we recess for lunch and see if we can make it back by half past 1:00.

ADMIRAL HAYWARD: I would like to make one short statement for the record that might clarify things. This is about what Dr. Cox said that pertained to priority of Sand Island, Kaneohe, and Honolulu. To make certain that it is clear from the Navy's standpoint, we wholeheartedly endorse the priority presently established, whatever plan, schedule, and the like that this council considers -- that we, the Navy, believe that the city/State plan or Sand Island/Kaneohe first is the proper one to take.

MR. STEIN: I do think that Dr. Marland made the statement that we could move all three simultaneously if we used our judgment. And you know, we just want to put this out. You have to be knowledgeable on this. Years ago, when I went to the hotel that I stayed at, I used to look over the reef and look at the sewage outfall on the other side from where we were swimming. And this morning, I spent the time on the balcony of my hotel room with a knowledgeable man here, looking at the quiescent place in the sea where the sewage outfall was emerging, and I recognized that we have a problem. The most difficult thing to say is what you should do first. I think that the realism in the magic and the great thing about Dr. Marland's suggestion was that we could hit them all. If that's the way to have the best possible world, I think that we should bend our wills to do that.

At this time, let me revise, and let's say we will be back at a quarter to 2:00.

(Whereupon, at 12:30 p.m., the conference was recessed, to be reconvened at 1:45 p.m., this date.)

FEDERAL HIGHWAY ADMINISTRATION

AFTERNOON SESSION

1:45 p.m.

MR. STEIN: May we reconvene, please.

We would like to complete the presentations by the Federal Agencies first. At this time, the State Department of Transportation has prepared a statement for us which we would like to have them present at this time.

Without objection, this will be entered into the record as though read.

STATEMENT OF
HAWAII DIVISION OFFICE
FEDERAL HIGHWAY ADMINISTRATION
HONOLULU, HAWAII

The Hawaii Division Office of the Federal Highway Administration appreciates this opportunity to present to your board today, the General Policy of our Administration for minimizing water pollution and possible soil erosion from highway construction.

To give credit where credit is due, the Federal Highway Administration does not administer highway construction projects in Hawaii; this is very competently done by the Hawaii Division of Highways under the direction of Mr. Tetsuo Harano, Chief Engineer. The authority for funds available to the Federal Highway Administration and utilized for planning, designing and constructing highways on the Federal-Aid Highway System by the individual States is Title 23, United States Code. Under the above authority, our Washington office promulgates, in cooperation with the States, policy for Federal-aid projects to develop nationwide uniformity on such matters as "water quality" which is the subject to which we now address outselves.

Recent specific actions by FHWA toward the maintenance of water quality and reduction of erosion followed the issuance of Executive Order 11258 in 1965 (revised by Executive Orders 11288, 11507 and 11514), which required that specific actions be taken by each Department of the Federal Government to provide leadership in the nationwide effort to improve water quality through prevention, control, and abatement of water pollution. Subsequent to the issuance of the order, division engineers of FHWA discussed the matter with Highway Department representatives to determine whether the State's practice and procedures would achieve the objectives of the Executive Order. After consultation with the Federal Water Pollution Control Administration (now the Environmental Protection Agency) and the Department of Interior, instructional memorandums were issued with guidelines outlining procedures for maintaining water quality and reduction of possible soil erosion occurring during and following highway construction, and for the draining of stormwater from Federal-aid and direct Federal highway construction projects. Since January 1, 1967, Federal-aid plans, specifications, and estimates must contain provisions to keep pollution of all waters by highway construction to a minimum.

Major emphasis was placed on reduction of erosion and on the control of siltation, although pollution by chemicals, raw sewage, lubrications, fuels and the like was not ignored. Sample specification language was furnished for consideration by those States whose existing provisions needed improvement. Measures that were suggested included limiting the area of raw, erodable earth exposed at a given time; construction of silt basins; timely planting of erosion control grasses and plants; limitations on fording streams; and reasonable restrictions for bridge and culvert construction. Cooperation with other public agencies having an interest in this matter was emphasized, as well as consistency with their laws and regulations.

To assure compliance with the issued guidelines, all States were requested to review their existing construction specifications and incorporate any necessary changes to accomplish the objectives and intent of the guidelines and the President's Executive Order. Some of the major practices and procedures included in the guidelines to aid in promoting the abatement of water pollution and soil erosion on Federal-aid highway construction projects are:

Highway locations are to be selected with due consideration of the problems associated with the basic elements that will greatly reduce erosion during and after construction.

During the construction of a project, the contractor must exercise every reasonable precaution throughout the life of the project to prevent silting of rivers, streams, and impoundments.

Prior to the suspension of construction operations for any appreciable length of time, the contractor shall shape the top of earthwork in such a manner that will permit the runoff of rain water with a minimum of erosion.

Temporary erosion and sediment control measures, such as berms, dikes, etc., deemed necessary by the engineers shall be provided and maintained during construction until permanent drainage facilities and erosion control features are completed and operative.

Frequent fording of live streams with construction equipment will be held to a minimum and, where necessary, temporary bridges or other structures shall be used.

Contractors shall provide adequate sanitation facilities on all construction projects meeting the standards established by State health authorities.

The final condition of borrow or waste pits shall be finished or covered with vegetation in such a manner that it will not be a contributing factor to water pollution.

Excavation and embankment operations will be closely correlated with the seeding and mulching treatment of cut and fill slopes so that their surfaces will not be exposed for an extensive period of time and thereby contribute to soil erosion.

These controls, required on all Federal-aid and direct Federal highway construction projects, are now being included also as directives or special provisions in the majority of State highway specifications. Other steps to control erosion and to prevent water pollution during highway construction may be directed by special provision on some projects; for example, seeding slopes as soon as possible as work progresses; step-cutting of slopes to help seeding get started; and constructing brush filter zones at the toes of fill slopes.

A highway built to current standards has few erosion problems after its completion, particularly if good maintenance practices are followed. All highway agencies recognize the potential detrimental effects of erosion within the highway right-of-way and accordingly, give special attention in design to preventive measures where needed. The success of these measures is evidenced by the many miles of highways now serving the traveling public without serious erosion scars.

Highways not properly located, designed, constructed, or maintained are at times subject to erosion and may contribute to stream pollution. Serious erosion not only results in unsightly conditions and increased maintenance costs, but sometimes causes safety hazards.

Problems encountered in finding feasible ways to minimize erosion are varied and complex. Several disciplines of science and engineering are required to reach an acceptable solution to most erosion problems. Highway designers, project engineers, and maintenance personnel use the advice of hydrologists, hydraulic engineers, soil engineers, soil scientists, agronomists, landscape architects, and other specialists to minimize erosion problems.

Erosion control guidelines encompass all phases of highway engineering to realize economical and effective control of erosion that might occur. National guidelines for the control of erosion must necessarily be of a general nature because of the wide variation in climate, topography, geology, and soils encountered in different parts of the country. For example, erosion control must be given careful attention in the design of a highway transversing an area of rough topography, erodible soils, high and constant wind velocities, and heavy precipitation. A high degree of erosion control is required in a watershed that is the collecting area for a public water supply or a recreational facility.

Erosion is controlled to a considerable degree by geometric design as well as by drainage and landscape development. It is minimized by the use of flat side slopes rounded and blended with the natural terrain; drainage channels designed with due regard for depth, width, slopes, alinement, and protective treatment; facilities for ground water interception; protective devices, such as dikes and berms; and protective ground covers and plantings.

Complete explanation of measures taken to minimize erosion related to highways is found in guidelines for minimizing possible soil erosion from highway construction, a report presented to Congress in 1967 and distributed to State Highway Departments by Instructional Memorandum 20-6-67.

With regard to drainage, it is recognized that for more effective and efficient control of water pollution, communities should attempt to construct separate storm and sanitary sewer systems. Drainage provisions for Federal and Federal-aid highways are to reflect this trend. The State Highway Departments are advised that the drainage of water carried to or falling on a highway right-of-way should be routed to adequate natural drainage courses or to existing storm sewers if the latter have sufficient capacity and can conveniently serve the highway's needs.

When it is not practicable to discharge highway drainage into an adequate natural drainage course or an immediately accessible separate storm sewer of adequate capacity, one of the following alternate solutions is to be adopted:

Construction of a separate storm sewer to handle drainage resulting from the highway construction, such sewer to empty into an adequate natural drainage course or be connected to another existing storm sewer of ample capacity to handle its present flow plus that contributed to by the highway drainage.

Connection to an existing combined sewer provided that the sewer has adequate capacity to handle present flows plus the additional flow, if any, resulting from the highway drainage.

The selection of an alternate solution is to be made in the earliest stage of project planning based on the following considerations:

Impact on appropriate water quality standards.

Cost versus benefits to be derived for each alternate.

Pollution control (reduction of pollution impact on receiving waters must be optimized).

Sewer separation plans of the State or local jurisdiction.

Plans for control and/or treatment of combined sewage in excess of collection system or treatment plant capacity.

Compliance with State statutes and local ordinances and regulations.

Many highway projects in urban areas involve widening of existing streets in areas currently being drained into combined sewers. Although the continued drainage of surface water from these highway improvements into a combined sewer is not considered desirable, alternate solutions for disposal of the surface water will frequently not be feasible because the local government has not provided a plan and an implementing program for separation of combined sewers. In these instances, drainage of the highway to the combined sewers may be continued if the project does not result in significant changes in the hydrology of the area drained. If the highway construction results in significant additional surface water discharges to combined sewers, separate storm drainage is to be provided, or other alternative solutions are to be determined by consultation between the Federal Water Quality Administration and other agencies involved.

Section 136(a) of the Federal-Aid Highway Act of 1970 included requirements regarding guidelines for minimizing soil erosion resulting from highway construction. Mr. F. C. Turner, Federal Highway Administrator, issued an Instructional Memorandum dated January 29, 1971, in which he states,

> Adherence to the guidelines included in the above issuances should minimize soil erosion from highway construction as required by Section (136(a) of the Federal-Aid Highway Act of 1970, and shall apply to all proposed projects on which plans, specifications and estimates have not been approved before the issuance of this memorandum.

The guidelines referred to in this quotation are Instructional Memorandum 20-6-67 previously mentioned and included in this paper as Exhibit "A", Instructional Memorandum 20-3-66 issued June 7, 1966, containing instructions on methods of minimizing water pollution by application of proper planning, location, design, scheduling, construction practices and maintenance, copy enclosed as Exhibit "B," and Instructional Memorandum 20-3-70 setting forth temporary project water pollution control contract provisions which were to be incorporated into future Federal-aid construction contracts to minimize soil erosion during construction, copy enclosed as Exhibit "C."

(The above-mentioned Instructional Memorandums, marked Exhibits, are on file at Hq. Environmental Protection Agency, Washington, D. C., and Region IX, San Francisco, California.)

In closing this presentation on "water quality" relative to highway construction and maintenance, I would like to introduce Mr. Herbert Tateishi, the Assistant Chief Engineer in charge of design for the Hawaii Division of Highways. It is his unenviable task of making national promulgated policy fit the specifics of Hawaii and thereby fulfill the intent of legislation and Presidential Executive Orders to protect and possibly enhance our water quality for the future.

Thank you.

MR. STEIN: At this time, I would like to call on the representative of the United States Air Force, Mr. Ben Kosa.

BEN KOSA

STATEMENT OF
MR. BEN KOSA
UNITED STATES AIR FORCE
HICKAM AIR FORCE BASE
HONOLULU, HAWAII
(REPRESENTING COLONEL ERNEST W. PATE, COMMANDER, HICKAM AIR FORCE BASE)

MR. KOSA: Mr. Chairman, conferees, ladies and gentlemen. I am Mr. Ben Kosa, representing Colonel Ernest W. Pate, Hickam Air Force Commander.

The Air Force is vigorously pursuing a program to provide for the environmental protection of Hickam Air Force Base and the surrounding waters which includes Pearl Harbor. There are either existing, under construction, planned or programmed measures to meet this objective. At the present time, there are three major sources which can be identified by the Air Force as contributors to the pollution problem in the Pearl Harbor area. These are a part of the domestic sewage flow from Hickam, industrial discharges from the aircraft wash racks and the effluents from the sewage oxidation pond at Wheeler Air Force Base which is discharging in the Waikele Stream flowing into Pearl Harbor.

A part of Hickam sewage is presently being processed through the Tri-Service Sewage Treatment Plant at Fort Kamehameha and a portion is being disposed of in the Pearl Harbor entrance channel via either of two outfalls. A military construction program project currently under construction will provide the necessary tie-in to divert all of Hickam domestic sewage through the Tri-Service Sewage Treatment Plant. This project is nearing completion and all Hickam sewage will be flowing through the treatment plant by February 1972.

Wastewater from industrial washing is presently being discharged untreated into Mamala Bay from the two aircraft wash racks located on Hickam. We have just last month completed the construction of an industrial waste treatment plant to treat effluent from one of these two wash racks. Operators are currently being trained and this treatment plant will be in operation within a month.

A contract for the construction of a second treatment plant was recently awarded. The construction of this plant will be completed by April 1972. The treatment effluent from both these industrial waste plants will be diverted to the Tri-Service Treatment Plant for further treatment to secondary quality. Upon completion of these two plants, the quality of the industrial wash racks discharges will meet the requirements of the Hawaii water quality standards as defined in the Public Health regulation.

In July of 1970, a determination was made to use oxidation ponds for the treatment of sewage from our new housing project at Wheeler Air Force Base. The design of these oxidation ponds were reviewed and sanctioned by your office, then known as the Federal Water Pollution Control Administration. Laboratory tests' results of the effluent from the pond do confirm that the ponds meet the receiving water standards for Class II Waters. However, the ever-increasing emphasis for advanced wastewater treatment has destined the life of these ponds to an interim usage category. We are currently programming for an interceptor sewer main to divert sewage from the ponds to the Schofield Barracks sewage treatment plant. The use of these ponds will be terminated upon completion of this new sewer pipeline.

The Air Force has been working and will continue to work for environmental protection and pollution control in Hawaii. The environmental quality of Pearl Harbor does have a direct and profound impact to the daily lives of our personnel, since Hickam Air Force Base is located on the shores of this estuary. Accordingly, the Air Force in Hawaii does wholeheartedly endorse the intended purpose of this conference.

(The following letter to the Administrator, Environmental Protection Agency from Malcus S. Horton, Colonel, United States Air Force, Director of Operations and Maintenance, dated September 29, 1971, was submitted by Mr. Kosa to be included in the record.)

"Reference is made to the Air Force testimonies made by Mr. Ben Kosa, Hickam Air Force Base, and Mr. Edward Lau, Headquarters, Pacific Air Forces during the Water Pollution Enforcement Conference on Pearl Harbor held on 21 to 23 September 1971.

"We acknowledge the requirement to provide an interceptor sewer at Wheeler Air Force Base (AFB) consistent with the selected Waikele watershed plan and as indicated in paragraph 9 of your conclusions and recommendations presented on the last day of the conference. While we recognize that this new requirement provides for the abandonment of the existing treatment facilities at Wheeler AFB, we would like to submit, as a matter for the record and to further clarify testimonies presented by the Air Force, the attached letter from your Pacific Islands Representative dated July 1, 1970 to our office regarding your most recent concurrence of the existing facilities.

"If you have any further questions on the above matter, you may contact Mr. E. F. C. Lau, extension 445120/445454 or Lt. Col. F. J. Smith, extension 444743/444433."

(The following letter to E. E. Briesemeister, Colonel, United States Air Force, Director of Operations and Maintenance, from Donald B. Mausshardt, Director, United States Federal Water Pollution Control Administration, Pacific Southwest Region, dated July 1, 1970, was submitted by Mr. Kosa for the record.)

"We have reviewed the 'performance specifications' for the oxidation pond at Wheeler Air Force Base, Wahiawa, and our comments are as follows:

"1. The Bureau of the Budget, in Circular No. A-81, Revised, has interpreted the term 'performance specification.' Specifically, for water pollution control measures, performance specifications are 'waste water effluent standards,' and permissible limits pertaining to the rate of flow and concentration of pertinent pollutants. We have reviewed the Wheeler Air Force Base project using this definition of 'performance specifications.'

"We did not determine the adequacy or effectiveness of your proposed plans and specifications to secure the performance specifications. The Federal Water Quality Administration has been severly criticized for duplication of engineering plans and specifications reviews. Therefore, it is the intent of FWQA that we will limit review to performance specifications. This would not preclude us from reviewing plans and specifications and giving our recommendations to an agency deficient in technical review capabilities if they make such a request.

"2. We have also reviewed the project, generally, from the standpoint of environmental impact. The plans and specifications were of assistance in this part of the review. The effluent from this treatment plant ultimately will enter West Loch of Pearl Harbor. At this point in time, there would appear to be no deleterious effects. However, with the burgeoning economic growth of the leeward area, there exists the possibility of increased numbers of wastwater effluent discharges and storm drainage going into the streams. Pearl Harbor will be the ultimate sink for these wastes. Accordingly, it must be recognized that at this future point in time in more stringent interpretation and implementation of 'performance specifications' will have to be made. There are no adverse comments to be made on the project.

"The treated discharge of the Wheeler Air Force wastewater treatment facility must meet the State-Federal Water Quality Standards for Hawaii. Your attention is directed to the following extracts from the enclosed Standards: (a) All waters should be free from all substances listed in Hawaii Public Health Regulations, Chapter 37A, Section 6A (five freedoms). (b) The pH of the effluent should be maintained between 6.5 and 8.5. (c) Dissolved oxygen of the effluent should not fall below 5.0 mg/l (d) Chlorine residual should not exceed 0.2 mg/l in the wastewater discharge.

"It is recommended that these criteria be adopted as your 'performance specifications.'

"We appreciate the opportunity to review the project and to comment on 'performance specifications.' For additional information you may contact Mr. D. B. Mausshardt, phone 949-5923 or 949-5924, or Mr. M. Koizumi at the same numbers."

MR. O'CONNELL: I would like to ask a question of Mr. Kosa. You say that you plan to have an interceptor to allow the abatement of the pond water. What is your intention with regard to timing with that project?

MR. KOSA: The project is just in the planning process. We are proceeding through the commander for approval. We have as yet received no definite time frame on approval and construction for this Island.

MR. O'CONNELL: Well, in the normal course of your experience, what would be the -- in other words, what would be the earliest time frame; would it be in the Fiscal Year 1972?

MR. KOSA: I can't give you that information at this time. In other words, we have a proposal with the city or the municipal treatment for 3 years. As to whether the Air Force is going to be able to keep up with this -- in other words, we have no control over the higher headquarters. We can submit the project and emphasize the importance of the project as to the internal problems here. The situation that we have in getting the project funded would mean just how much emphasis we would have.

I presume that the construction would be designed and that 1973 would be possibly the year.

MR. O'CONNELL: So that construction might follow in the Fiscal Year 1974, normally?

MR. KOSA: Normally, yes.

MR. STEIN: I think we should emphasize that when we came up with this plan we also preferred that the military work this out on a local basis, but it is very important that we all proceed together on this. If either you or your people need any help, as to recommendations or for representation in Washington to get this moving in concert, this should be made known to us so that we can do it. Again, we must recognize that this is one Government -- I speak to you as a representative of this Government -- and we are going to be in a pretty bad posture asking people here to do something if the Federal interest is not going to keep pace with them.

MR. KOSA: Well, we have tried for several years to fund this project for the sewage line, and as late as 1970 too, when we received the letter from the Agency in July of 1970 which allowed for the continuation of this, it sort of weakened our case.

MR. STEIN: Well, I'm here to strengthen your case and to give you my personal views. I don't think that I am going to recommend to the Administrator that we ask the city or the people in Hawaii to go along with the schedule more rapidly than we are going to ask our Federal installation. I don't see how I can possibly make that kind of a recommendation, particularly when we have a much better and bigger project and much more contact.

I recognize that you have to fit into a budget -- and I want you to understand that I'm not directing this to the Air Force here or you people -- but I know the problem that we all have in obtaining appropriations and the approval of the budget. We have the same thing. But I don't think in all fairness that we can't move together with all people on this.

STATEMENT OF EDWARD LAU, HEADQUARTERS, PACIFIC AIR FORCE

MR. LAU: I am Edward Lau from Headquarters Pacific Air Force. I would like to qualify some of the statements referring to questions of the Air Force stabilization ponds.

I would like to give a whole picture of the area of discharges into the Waikele Stream. The Army also had a stabilization plan originally there in 1966. This stabilization pond was built because the Army did not have sufficient capacity in their existing plant. It was built for 250 housing units to serve a new housing program there; and it was cleared through the FWPCA.

In 1970, the Navy also proposed construction of an additional 200-house housing unit, which again, went into the Federal Water Quality office of the Deparment of Interior and obtained by letter their approval, dated 1 July 1970 for current use of the pond. And they indicated at this point in time the treatment and the existing treatment provided by the facility was adequate.

We showed them some results which showed them -- with the cooperation of the existing Army plant -- that we did have a good treatment plant. In May and June of this year we conducted identical studies on it to show that the treatment present in this stabilization pond is essentially secondary treatment. For instance, by chemical oxidation, it showed an average of 91.3 percent treatment; and the coliform also showed 99.9 percent treatment.

I submit that the existing unstabilized pond is as good, if not better, than any secondary treatment plant.

The plan that Mr. Kosa spoke about was an overall plan. It was a treatment plan for the Central area where all discharges would be eliminated from Waikele Stream through the interceptor sewers that he spoke about. It is a connector or the eliminating pond, and it goes to the now Army plant.

If we did that now, I submit that we may even get a lesser degree of treatment than we now have, until such time as the State can tell the Army where the effluent can go to -- to Waikele, or to irrigation, or to Waiau.

What I want to clarify is that the existing ponds have proved adequate treatment to the best of the ability of the operation and to the capabilities of the pond for the facility.

MR. STEIN: I think that's all well taken, and we understand that. However, what we are having here -- this is what I am trying to make clear -- no one is saying that you haven't done what you were supposed to in the past, or that you haven't obtained proper clearance.

What we are hoping to do is to get all of the community -- the Federal as well as the local -- to join to that system and move together towards completion in an orderly way. Now I suggest, as we heard from the Navy this morning and Admiral Hayward, we have been working on, and apparently they have a design to work in very close fashion with the State, the county, and the city. I suggest that if we are going to do this job, it's going to be very, very complete. But we had to get everyone together. But I think where we have a Federal installation, we should be prepared to be able to join with these people at an appropriate time and not hold up a project.

I believe, even if we were funded, that the Army could not meet the 1973 time schedule. It is not in conflict with the existing plan or the new plan for which funds are provided, but with meeting the requirements of the discharges. Where is it going? There is not money now in the military program for this.

MR. LAU: Because of the director the conclusion, at the direction of the State, so to speak, so far as the requirement for abatement, it would be irrigation or primary treatment. Frankly, it has not been considered.

DR. QUISENBERRY: We can go over this. That's why we're here. The conclusions are going to be made very soon. What I am discussing is when the decisions are made at the Federal installations, including us, be prepared to join with us and not have any delay because of any action upon the Federal Government.

MR. LAU: I would agree with that, also.

MR. O'CONNELL: Continuing with the Federal Agencies, we will now hear from Lt. Arthur N. Mabbett from the United States Army, Hawaii.

STATEMENT OF

LIEUTENANT ARTHUR N. MABBETT

UNITED STATES ARMY

HONOLULU, HAWAII

LT. MABBETT: Mr. Stein, conferees, Dr. Quisenberry.

The Federal Water Pollution Control Act, as amended, states that pollution of navigable waters shall be subject to abatement whether the pollutant is discharged directly into receiving waters or if it reaches such waters after earlier discharge into a tributary. The State of Hawaii has classified their waterways and has adopted water quality standards pursuant to the provisions of the Federal Water Quality Act of 1965. Presidential Executive Order 11507 and existing Army regulations require the Army to conform to state water quality standards. Our responsibility is clear, and my presentation will describe our efforts in meeting this responsibility.

In order to insure the United States Army, Hawaii, does not contribute to the degradation of the Hawaiian environment, an extensive environmental protection program has been established. The program is comprehensive in nature and concerns all aspects of pollution; specific areas of concern include: water, air, and noise pollution; waste disposal, including solid, liquid, and chemical waste; radiation; pesticides; and education. We have followed guidelines provided by the Department of the Army and in essence our responsibilities have been:

1. To identify environmental pollution problems on installations and activities under USARHAW and take action to accelerate corrective measures.

2. To monitor existing environmental control methods within the command to assure that these methods maintain the required degree of pollution control.

3. To maintain liaison and cooperate fully with representatives of Federal, State, and local pollution abatement authorities.

In considering pollution sources of Mamala Bay and Pearl Harbor, four installations come into scrutiny. These are: 1) Tripler-Ft. Shafter; 2) Ft. Kamehameha (popularly known as Ft. Kam); 3) Waiawa Radio Station; and 4) Schofield Barracks. I will discuss these in the order given:

1) TAMC-Shafter. At this time, sewage generated

from Tripler Army Medical Center and Ft. Shafter is pumped to Sand Island, and discharged without treatment through a submerged outfall into Class A waters. The discharge totals approximately 1.2 million gallons per day. In the future, however, the Army will receive treatment and disposal services from the proposed city of Honolulu facilities to be built on Sand Island. We have received a formal assurance from the Mayor of Honolulu that the city will provide these services and only financial arrangements remain to be negotiated.

2) Ft. Kam. Ft. Kam is primarily an Army housing area and our primary pollution problem is the discharge of raw domestic sewage through a submerged ocean outfall into Mamala Bay, at an estimated rate of 42,000 gallons per day. However, we are scheduled to divert our sewage to the Navy's Tri-Service Sewage Treatment Plant by December of this year. All necessary piping work has been completed and we could theoretically effect this diversion now, except that other unresolved non-Army construction and operational problems elsewhere within the sewerage complex prevents our usage of the Tri-Service Sewage Plant at this time. The State Department of Health has been informed of this pollution source, and we are providing the State with technical data relating to the characteristics

of our sewage from both TAMC-Ft. Shafter and Ft. Kam on a bi-weekly basis.

3) Waiawa. Operations at the Waiawa Radio Station facility, which is located near the Mililani Cemetery, are primarily family housing in nature. The main pollutant to consider here is sewage, which could flow into Pearl Harbor. However, we have a sewage treatment plant which uses a primary clarifier and oxidation pond and presently no sewage is discharged into any waterway. The plant was designed to handle approximately 33,000 gallons per day, yet due to the closing of the Waiawa Radio Station, the present load amounts to only approximately 3,000 gallons per day. On account of this small load, the plant efficiently disposes of the liquid portion through percolation into the ground and by evaporation through exposure to sunlight. The plant has been reported to both the State Department of Health and the United States Navy and has been inspected on numerous occasions. Both the State Department of Health and the local office of the Environmental Protection Agency have confirmed the fact that sewage is not discharged into adjacent waterways. The U. S. Navy is also satisfied that Waiawa is not a source of sewage pollutant, and they have stated in their Pearl Harbor Pollution Model Study, dated April 1971, that,

"No corrective measures are recommended for this facility."

4) Schofield Barracks. Our last, but certainly not the least, installation to consider is Schofield Barracks. Schofield Barracks is the largest Army installation in Hawaii, and appropriately enough, our biggest pollution control problem lies here. As in the discussion on TAMC-Ft. Shafter, Ft. Kam and Waiawa, water pollution due to the discharge of domestic sewage is the prime pollutant to consider. Schofield Barracks has been served by an Army-owned secondary sewage treatment plant employing the trickling filter process since 1932. Present flow amounts to approximately 1.6 million gallons per day. The plant is now obsolete and unsatisfactory in regard to meeting the State of Hawaii water quality standards of the receiving stream into which its effluent flows. However, the plant has provided some degree of protection to Waikele Stream, the community of Waipahu, and West Loch, Pearl Harbor, a flowing distance of about 9 miles.

The Army has planned to replace this plant since 1966 with the primary objective being, throughout the development of the project, that a new plant with improved performances over that of the existing facility would be provided. Moreover, the justification for this project from its initial stages in 1966 has been predicated on the concept that the new plant's effluent will meet the then pending State's water quality standards. The State of Hawaii's water pollution regulations were made effective in July 1968, with the official public announcement being made on March 6, 1970.

The State's water pollution regulations have classified the navigable waters of upper West Loch, Pearl Harbor, the highest classification, Class AA. On the other hand, the State has assigned to Waikele Stream the major tributary of West Loch, the lowest classification and standards applicable to freshwater areas, Class 2.

This illogical setting of classifications and water quality standards has caused undue difficulties to both military and civilian communities located in Central Oahu, with respect to the control and abatement of water pollution emanating from these inland areas.

Our proposal to provide a new secondary activated sludge sewage treatment plant was meant to satisfy the water quality standards of Waikele, the receiving stream. This approach was generally acceptable to both Federal and State regulatory and enforcement Agencies, who were aware of our project, until about the latter half of 1970, when we were informed that objections had been raised to the discharge of sewage plant effluent into Waikele Stream.

The objections apparently arose due to the awareness, passage, or new interpretations of the Federal Water Pollution Control Act, the Rivers and Harbors Act of 1899, or the State of Hawaii regulations on water pollution control and water quality standards, which shifted the attention from Waikele Stream to West Loch, Pearl Harbor.

The State Department of Health wants sewage plant effluents out of Waikele Stream. Suggestions have been submitted to the Army that we divert our sewage flow discharge into nearby Lake Wilson, located between the community of Wahiawa and Schofield Barracks. We have been informed that the State Department of Land and Natural Resources objects to this proposal because Lake Wilson is already polluted with sewage wastes, and that the addition of the sewage plant effluent from Schofield Barracks would seriously jeopardize the continuance of aquatic life within the lake.

Suggestions have also been submitted that we recycle our sewage plant effluent by using it to irrigate our golf courses or to use it to irrigate agricultural lands in Central Oahu. We have been informed by the Honolulu Board of Water Supply that this proposal cannot be favorably considered at this time because of the suspected danger of contaminating the potable ground water supply.

We were informed that the Board of Water Supply has a solubility study under way which will be completed in about 3 to 5 years, and that a final decision on this matter cannot be made until the study has been completed. We have also been advised by the local EPA representative that treatment of our sewage plant effluent by tertiary means will not suffice and therefore is not an acceptable solution. In addition, it has also been suggested that we construct an enclosed conduit to convey our sewage to the Ewa District for eventual disposal into the ocean through the proposed municipal Honouliuli ocean outfall.

While these suggestions have been made with the sincere interest on the part of others to help the Army solve the problem of disposing of our sewage plant effluent, it deals with and proposes solutions on an individual basis. As I have stated previously, there are other military and civilian users of Waikele Stream and several regulatory agencies involved in the use of the land and waterways of Central Oahu. It is clear that this is a regional problem which requires resolution on a regional basis. The problem in Central Oahu is no different than the problems at Sand Island, Kaneohe Bay and Pearl Harbor.

There are many waste discharges and many regulatory agencies. At the present time we do not have a single coordinating body to effect a permanent solution which will be acceptable to all Federal and State regulatory Agencies and meet all water pollution abatement requirements. What we ask is that a coordinated regional masterplan for Central Oahu be adopted immediately so that adequate sewage treatment facilities may be provided the Schofield Barracks area.

The rules of the game here have placed all waste dischargers into the Waikele Stream in a "cul-de-sac," a "checkmate." We are maintaining liaison with the local EPA office; the State Department of Health; and the Office of Environmental Quality Control; the Army Corps of Engineers, Pacific Ocean Division; the United States Navy; and the City of Honolulu Division of Sewers in the hopes of obtaining an early solution to this matter. Our efforts, though, in the control and abatement of water pollution are not confined to that of sewage waste.

On May 6, the President's Council on Environmental Quality stated that at least 14 commonly-used materials may pose serious health and environmental problems. Among the materials listed included lead, arsenic, barium, chromium, and zinc, just to name a few. In many cases, these elements, once discharged into receiving waters, are taken up by aquatic organisms and passed along the food chain. As they pass from species to species, the relative concentrations are increased and may reach or exceed the maximum limits established by the Food and Drug Administration.

Following the Council on Environmental Quality's announcement, officials of the United States Army, Hawaii, initiated a survey to determine the extent and use of chromate-containing additives in water-cooled air conditioning units. Chromate-containing additives have been used commonly to control scale formation, corrosion, and slime growth. The survey revealed that approximately 4 pounds per month of chromate-containing additives were utilized in water-cooled air conditioning units at Tripler Army Medical Center. Air conditioning wastewater discharge totaled 800 gallons per month and was released into the sanitary sewer system serving Tripler Army Medical Center and Ft. Shafter. Results of this survey were reviewed and immediate steps were taken to halt the use of chromate-containing additives in all Army water-cooled air conditioning units. The use of nontoxic additives and the conversion of the systems to a no-discharge system has been initiated.

In order to meet State of Hawaii Public Health and Army regulations, we have established an environmental laboratory. The laboratory is presently staffed and equipped and has the ability to conduct numerous physical, chemical, and bacteriological analyses. Establishment of the environmental laboratory capability has allowed us to obtain current information concerning the characteristics of sewage plant effluents emanating from our various sewage outfalls. It has also allowed us to expand our weekly water quality surveillance program to include improved sampling techniques and practices, implementation of a number of salt water beach surveys to insure that swimming waters meet the established standards and are safe for recreational use, and establishment of a stream-surveillance program to insure that streams flowing through U. S. Army property are not subject to increased pollutional loads.

Other Army water pollution abatement and control projects have included:

1. The initiation and completion of a comprehensive waste survey in order to insure that all Army facilities in Hawaii were properly disposing of their waste materials.

2. Controlled planting to abate soil erosion of bare grounds.

3. Entering into an agreement with the U. S. Bureau of Sport Fisheries and Wildlife, and the State Department of Land and Natural Resources in a concerted

effort to conserve and develop our fish and wildlife resources.

4. Development of an extensive pesticide program to include: a) review of the currently utilized pesticides, insecticides, and herbicides in order to insure that usage is in compliance with all existing Federal, local and State regulations; b) review of the current methods of application to insure that ground water or surface water contamination does not occur; c) an immediate halt to the spraying of lawns and similar areas for the control of Army and web worms. Control is now dependent on parasites, predators, and diseases of these insects; d) a halt to the use of DDT in outside areas.

In summary, I believe that our progressive environmental quality protection program is well on its way to solving many of our problems. Yet, much more remains to be done if we are to insure that pristine Hawaiian waters remain so and that those currently being polluted are upgraded to the natural state they were once in. This realization can only be attained through joint action and funding by local, State, and Federal Agencies.

I thank you.

MR. O'CONNELL: Well, I thought the Army had a lot going for them, but after listening to your presentation, we find that you're in the middle of a fix -- unless the coordination with Central Oahu be attempted, if not immediately, in the very near future.

LT. MABBETT: As I understand it, the Army does have the funds, the facilities to have presented a contract immediately. We have approximately $2.5 million that has been funded, and we are starting to get bids for contracts; and they could start work by the 29th or 30th of September -- that's this month -- and it would be completed by October of 1973. This depends, of course, on any action this committee may take.

MR. O'CONNELL: Let me ask a question for my own information. What is the possibility of reprogramming these funds if it is determined during the fiscal year that some other solution may be more appropriate? Is this a possibility?

LT. MABBETT: This is a possibility, and the Army would have a problem if this was postponed. I am hoping that the funding may be initiated. I feel that we want an interim phase, for time has already gone by, and if we don't get a solution to this problem and the funds have not been released, they will revert automatically.

MR. O'CONNELL: This would be true, if these funds are not obligated this fiscal year, they would revert?

LT. MABBETT: This is true.

MR. O'CONNELL: You remarked earlier that all your waste discharge was going into the Waikele Stream, and perhaps Dr. Quisenberry is familiar with that and might comment. I was not aware of it.

One of the things that is unresolved here is the Army dump in Hickam area. Could you expand on that?

LT. MABBETT: That basically is the Air Force problem.

We handle some of their wash rack effluent. This likely will cause a problem until such time as this part of the construction is completed. We hope to have it resolved within the next 3 months. We will be tied into the system.

MR. STEIN: Thank you.

Are there any other comments?

I think that there are many people in the room who are aware of it. Dr. Marland has been aware of it, and several other speakers in this room have been concerned with this problem.

Is Mr. Freeman here?

MR. FREEMAN: Well, I'm not sure that I can add anything to what he said. There are not any inconsistencies in his statement. And what we're doing now is operating on the basis of maintaining control of the water to such an extent that it meets the quality standards in the whole problem area.

MR. STEIN: Let me ask this question of both of you. In what seems to me, in listening to you, -- and I'm sure it's kind of a poetic phrase, the "cul-de-sac" game being played -- I think that we have a real question here in the Schofield Barracks area. What are they going to do with it over there? What are the alternates? It seems to be irrigation or putting it into the city system or the county system.

I think we should be able to, by what we have in the record, provide the answers. I don't think that you have, if you wait for coordinating agencies to be set up.

Nobody will leave this room; we will not leave this room; we will not leave this Island until we have solved this problem. Does that answer your question?

LT. MABBETT: Yes.

MR. STEIN: There are 2 alternatives. One is consisting of consuming it for irrigation and using it for disposal on the land, and the other is the ponds. The ponds are treated wastes from the rain area tributaries. There they can be converted over to the windward side. These are all terms that have been suggested and are being considered, and then, going back to a lot of testimony that the plan should be adopted very soon.

MR. MINK: I think that there has been a lot of "nit-picking" about the matter of disposal of Army water and water from the military, which consists of about 2 million gallons per day.

There has been a certain amount of work done on some of it; there are established plans. The objection on my part is I object -- I think the only problem that remains is the disposal of virus, if in effect it does occur, from sewage water in the soil. I don't think you should hope that it would take 3 years to determine whether this is in fact a limiting factor of the disposal of the water.

MR. STEIN: If you want to go over this, let me say something. I have been hearing about virus in the soil for 3 years, but have been in this business for about 25 years. Unless there is a real breakthrough that I don't know about, you are not going to have an answer on viruses in 3 years that you don't have now.

Let me make this clear. As I see it, the people up there have to decide whether the effluent is to be used as irrigation water on the ground. If they don't, someone is going to have to decide to dispose of it somewhere else. This seems to be the alternative. We are going to have to do this very rapidly in order to let the Army go along with it.

DR. QUISENBERRY: I was determined that I was not going to let this be discharged into Waikele Stream. It was a hard decision to make, but we agreed that the alternative best to be used was to use it for irrigation purposes.

MR. STEIN: I fully agree with you, Doctor, in view of what you say. You have a right to let or not let it be fed into the stream. If you feel that it should be used for irrigation purposes, then we have this from the State Department of Health. If there is an objection to that, then I just think that the tri-basin system is the only other solution.

If the people up there want to lose that water, I guess that is their business. This is going to have to be worked out because we cannot go along with their problem for too much longer.

I think we heard from the Federal Government, the State and Dr. Marland and the city and local government. We have the making of a program, and I suspect we will -- well, I won't use my prerogative as Chairman, but be neutral -- but characteristically, it might be one we have to play by ear. This is the kind of problem we have to resolve. You are going to have hundreds of problems like this before we can put this program to rest. You are going to wrestle with this over and over again.

If you are going to let a problem like that hold you up you never will get your work done. In other words, you have to make a decision and live with it.

Some day some bright young man will come up with the answer to the virus problem, but we haven't been able to find that out yet, and I suggest that they leave the program to go moving ahead.

MR. O'CONNELL: Our next speaker will be Mr. Fred Haughton, State Conservationist, USDA.

STATEMENT OF

FRED HAUGHTON

STATE CONSERVATIONIST

UNITED STATES DEPARTMENT OF AGRICULTURE

HONOLULU, HAWAII

MR. HAUGHTON: Mr. Chairman, conferees, ladies and gentlemen.

I was asked to describe the magnitude of the sediment problem in the Pearl Harbor drainage area. This is an impossible task for we do not have any exact measurements. The best that I can do is to attempt to describe some of the sources of sediment and tell of some of the work that has been done to control these sediment sources.

First, I had better say a few words about the Soil Conservation Service and our efforts to help land owners and occupiers to deal with soil erosion in the area. The Soil Conservation Service does not own or control any land. We are an Agency made up of specialists in various scientific disciplines concerned with planning and applying soil conserving programs and practices. We work extensively with and through local units of government to bring this assistance to the land owners who must make the decisions and spend the money needed to install and maintain the soil conserving practices. Soil and Water Conservation Districts, formed under State law and managed by local elected directors, are the principal local units of government with which we have Memoranda of Understanding and to whom we furnish our technical assistance.

One of the first Service employees to work in Hawaii was Dr. N. E. Winters. He arrived in 1938 and began work with a number of the large sugar and pineapple plantation operations. In 1947 the Territory passed the enabling legislation to form soil conservation districts. There are now 15 such districts that cover all of the principal islands except for a small part of Kauai.

The West Oahu Soil and Water Conservation District was formed in 1950. Most of the land in the Pearl Harbor drainage area is in this district. The remainder is in the South Oahu Soil and Water Conservation District which was formed in 1952.

Sediment has been recognized as one of the largest single water pollutants. And soil erosion and sediment are inseparable problems linked by the force of gravity. Sediment is made up mostly of detached soil particles that are carred along either suspended in the flowing water or as a bedload in channels. It is the erosive displacement of soil by the force of moving water that is the beginning of the chain of damaging effects. For the purpose of this presentation, I would like to divide erosion into three types: 1) the natural or geologic erosion that over the ages has shaped the face of the earth; 2) rural erosion that results from man's efforts to use the soil, in place, to grow cultivated crops; and 3) for lack of a better name, suburban erosion resulting from drastic land shaping when soil becomes a construction material for developments such as highway construction and subdivisions.

In the natural landscape, water acts as the erosive agent on soil-forming material long before it actually acts to dislodge particles to form sediment. As a weathering agent, it dissolves minerals and displaces elements causing rock to alter so that with the addition of organic material a soil is formed. The dynamic erosive action of water begins with the energy developed in the splash impact of the raindrops on the soil surface which dislodges particles of soil and is continued in the scouring action of water that runs off the surface and transports the dislodged soil particles. Splash erosion and runoff concentrated into rills, then gullies, and finally streams have transported upland soil material down to the valleys. When slopes flatten or stream reaches the ocean, the transported sediment is deposited. These are the forces that have shaped the rough volcanic rocks of the Prehistoric Koolau and Waianae ranges into the present island of Oahu. Under natural conditions vegetation covers much of the surface. Vegetation absorbs most of the force of the falling raindrop and impedes the surface flow allowing water to enter the soil and reduces runoff. Natural erosion is a slow process that gradually changes the landscape.

The erosive actions that occur when the land is used for the production of cultivated crops or for pasture for grazing livestock are little different than those described above. There are, however, many times when the soil is exposed and there are times when the soil surface is loosened by tillage. The soil conservation program for this land is designed to minimize these hazards. The Soil Conservation Service lists about 90 conservation practices and measures designed to minimize soil erosion and conserve soil and water resources. Plowing and planting operations are conducted on the contour. Diversions are installed to break up long slopes and to conduct runoff across the slope at a nonerosive grade. Grassed waterways or lined ditches are built to conduct the runoff safely to stream channels. Crop residues are maintained to protect the surface between crops. During the time that crops such as sugar cane and pineapple are growing, they provide good protection; and since they are both ratooned, the initial tillage operations occur only once in 4 to 6 years. The agriculturalist uses the soil as a natural body that is kept in place and managed so that this soil resource will be developed and conserved to produce indefinitely.

Suburban erosion is a relatively recent phenomenon and its impact on the environment is beginning to be widely recognized. Someone has described this as "the land where the bulldozer has taken over from the plow." Here the soil is not used as a natural body in place. Rather, soil is used as a building material that is ripped, pushed, piled, smoothed, compacted, and shaped. Ultimately, much of the land area may be paved or roofed.

Studies made in the metropolitan Washington area indicate that erosion from construction areas was found to average 151 tons per acre per year. This is about 10 times that normally expected from cultivated land, 200 times that expected from grassland, and 2,000 times that expected from forest land. When the developments are complete and the area has its permanent landscaping in yards and parks, the sediment yield falls to a relatively low value. However, the development will have altered the hydrology of the stream. The area of impermeable pavements and roofs has replaced large areas of formerly vegetated land. Rainfall can no longer percolate into the ground; most of it becomes runoff, considerably increasing the water flow from these areas. This results in greater erosion and flooding problems for downstream areas. Research is needed to evaluate the effects of massive suburban buildup on the hydrology of the stream.

The entire stream channel system must be considered in dealing with the sediment problem. Running water will carry very fine soil particles in suspension. It will also carry along large quantities of heavier soil particles as a bedload. The amount is directly related to the velocity of the flow. The faster the water flows, the more sediment it will carry. When the water slows a part of the sediment is deposited, but when the velocity increases, it will again pick up a bedload if there is loose material in the bottom or banks of the channel. If a debris basin or silt trap is installed, the channel below must be lined or stabilized in some manner to prevent the channel from being eroded by the clear water. Most streams in Hawaii have the gradient to produce high-velocity flows. Studies are needed to determine how much sediment reduction in stream flow can be tolerated without disturbing channel stability.

The Geological Survey has a number of gauging stations on streams that empty into Pearl Harbor. Sediment samples are taken at some of the stations. Some of this data is not yet published, and we obtained it from the local office of the Geological Survey.

One of these gauging stations where sediment was measured is located on Kipapa Stream near Wahiawa and is above the cultivated lands. This record probably indicates the sediment load that comes from the steep forest-covered, upper watershed lands. No bedload is recorded at this station, but there is an appreciable amount (650 tons per square mile per year) of suspended sediments. For lack of better information, we can assume this to be the result of natural or geologic erosion, and we would expect other stream systems to have a similar sediment load when they leave the forested upper watershed areas.

Other gauging stations are located well downstream. Using the USGS data, we have estimated that 123,600 tons of sediment is entering Pearl Harbor annually. We have no way of knowing where this sediment originates in the channel systems. Some of the suspended sediment can be considered natural erosion, but the rest could be the result of either rural or suburban erosion.

FRED HAUGHTON

As I mentioned earlier, Dr. Winters was the first SCS employee to work in Hawaii. We have a copy of a report he prepared in February 1940, that gives some indication of the soil erosion problems at that time:

"From the standpoint of erosion, the production of pineapple is the most serious problem confronting the agriculture of the Territory . . . Before 1938, it seems that very little thought had been given to soil and water conservation and erosion control by the pineapple corporations. In 1938 an experiment in planting on a controlled grade was started . . . This method of planting, in conjunction with diversion channels through the field, has been extended during the year of 1939 to larger fields. This is a step in the right direction and is decreasing erosion and soil losses considerably over the methods that had been in use. Previous to 1938, all the pineapple in the Territory were planted in straight lines resulting in large areas with rows up and down slopes varying from 5 to 25%."

The science and the art of soil conservation has had to develop with and keep abreast of the changes in agricultural equipment. This point is illustrated when you try to lay out contour field operations in pineapple fields so that the 50-foot booms on the equipment can effectively cover the rows. This means that every 100 feet there must be a field road. It further means that the curves and dips that can be laid out on the land must fit the capabilities of these machines. If contour curves are too tight, the long boom travels too fast on the outside and too slow on the inside curve which makes the precise spray application impossible. The result is uneven ripening and erratic production. This in turn adds to the harvesting costs and affects the quality of the crop.

Despite the difficulties, conservation practices have been devised for and applied to the pineapple lands. Although not on the contour, fields are laid out across the slope; and diversion ditches, gradient terraces and waterways conduct the runoff to controlled outlets. The field roadways are still bare and continue to present an erosion hazard,but much of the runoff from these areas is now picked up by the diversion systems.

In cane land the principal erosion hazard occurs when the land is open following harvest. During the time the crop is growing, the cane provides good vegetative cover to the soil. Plantations have adjusted harvest schedules so that the more steeply sloping fields are harvested at a season when heavy storms are less likely to occur. Most of the cane land in the Pearl Harbor drainage area is furrow irrigated, and the furrows themselves tend to control runoff.

We have no accurate measure of the effectiveness of the conservation programs that have been installed. Research is needed to measure the sediment yields from various conservation treatments so that an erosion equation can be developed for the soils and crops grown in Hawaii. The States east of the Rocky Mountains have developed such an equation. We are just starting to schedule the time to begin the studies needed to develop the soil-loss equation. We will be meeting with representatives from the Agricultural Research Service in a few weeks. When this study is completed, we will be able to predict the sediment yield resulting from erosion in the Pearl Harbor drainage areas. At present we can only speculate about the progress that has been achieved. I personally feel that agricultural lands in the Pearl Harbor area are not contributing excessive amounts of sediment.

The Service and the districts have also been concerned with the soil erosion and sediment problems caused when land is developed for subdivisions. This is a more recent concern. Perhaps the first effort along this line was in helping the city and county to develop the present grading ordinance. This ordinance was adopted in

1965, and it has not proved effective for a number of reasons. A new grading ordinance has been developed which will correct many deficiencies that exist in the present one. During the past year the Service has provided technical assistance and consultation to SWCD, community groups and the city and county. We have also undertaken to develop "Standards and Specifications for Conservation Practices in Urban Areas." At this time we are preparing a second draft. The first draft was dated April 1971, and was reviewed by many interested individuals and organizations. A document of this sort is needed to help land developers and contractors meet the requirements of the grading ordinance.

Recently, the Committee on Siltation of the Governor's Task Force on Pearl Harbor arranged for a meeting with representatives of the General Contractors Association and the Department of Transportation to discuss what might be done to maximize erosion control during construction. The contractors recognized a need for a nontechnical manual that job foremen could use. The Service will be meeting with the General Contractors Association to discuss erosion control practices and measures.

The city and county subdivision ordinance is also being currently revised. The Committee on Siltation also arranged for a meeting with county officials to discuss this document as it relates to erosion control. We anticipate being asked to review and comment on the draft ordinance.

Soil erosion is producing sediments that are a pollutant in Pearl Harbor. Very little data is presently available to define how severe the problem is or what the contributions are from various land sources. A detailed land-use and soil-erosion survey is indicated to locate and delineate sediment source areas.

Soil and water conservation practices have been extensively applied to the agricultural lands, but a study is needed to determine the effectiveness of these practices. A soil-loss equation should be developed that will measure the effect of various land uses and practices on sediment production.

Observations indicate that construction activities associated with the building of highways and the development of commercial and residential areas have allowed large amounts of sediment to get into stream channels. Erosion control practices and measures should be designed into plans for these developments, and the contracts for these works should include erosion control and sediment retention provisions. The subdivision ordinance and the grading ordinance that provide for erosion and sediment control should be adopted and enforced by the city and county. The Department of Transportation must control the soil erosion and sediment resulting from highway construction.

It is impossible to eliminate all erosion and sediment. The steep mountainous uplands will continue to produce sediment and the high velocity stream channels will transport this sediment towards Pearl Harbor. Each stream must be studied and a plan developed that will manage the sediment throughout the entire length of the channel system. Multiple benefits including flood control, industrial water supply, recreation and wildlife should be considered when these plans are developed. The necessary silt traps, sediment pools, and flood areas should be designed so that they blend into the landscape. Many such areas might become scenic walkways and park areas and would enhance the environment. Studies are needed to evaluate the effects that subdivision developments will have upon the hydrology of a stream so that increased runoff from storm drains can be designed into the channel improvements.

We agree with the earlier statements that government agencies, the city and county, State and Federal, need to immediately provide funds to correct the problems of Pearl Harbor. We would like to see the studies I have mentioned immediately embarked upon. We would like to see the land use regulations immediately effected and enforced. We would like to see the practices needed to control the erosion contributing to the siltation of Pearl Harbor immediately applied. And we are willing to approach our Agency to seek funds so that the USDA can participate in this effort.

MR. STEIN: Thank you very much. Are there any questions or comments?

If not, we will continue with the representatives of various industries. Our first speaker will be Mr. David Golding, who will speak on behalf of the Dole Pineapple Company.

DAVID GOLDING

STATEMENT OF

DAVID GOLDING

DOLE PINEAPPLE COMPANY

HONOLULU, HAWAII

MR. GOLDING: Dole Company supports the efforts of the community to maintain a healthful environment and to conserve our natural resources. We are supporting the effort in the Pearl Harbor Basin by participation on the Governor's Task Force.

The only operations of Dole Company which lie within the Pearl Harbor Basin are a part of the agricultural activities of Dole's Oahu pineapple plantation. Within this area, approximately 3,000 acres are devoted to growth of pineapple on a commercial scale. There is also one sanitary landfill used for spoiled fruit, canned fruit rejects not suitable for salvage, paper, scrap building materials from Mililani Town and similar materials suitable for a clean, sanitary fill operation.

Dole has participated in the Soil Conservation Service program for many years. Good conservation practices are followed wherever possible: fields are contoured and diversion channels and grassed waterways provided. There may be some siltation from roads. Roads are kept free of grass and weeds because experience has shown that vegetation growing on the roads is inevitably a source of weeds in the crop -- a serious problem in a crop with a 3-year cycle.

Percolation rates into the soils in this area are excellent. Soils will absorb at least 2 inches of rain without movement. In addition, of course a standing crop of pineapple is excellent for holding soil or trapping silt. Soil runoff from pineapple, therefore, would be expected only from fields in preparation or newly planted.

Fertilizers and agricultural chemicals approved for use on pineapple are used in the minimum amounts required. This is not only good conservation practice; it is good business practice as well. Chemicals used include the nonpersistent insecticide, malathion, 4 pounds per acre two or three times per crop. Mirex ant bait is used at the rate of 5 to 10 grams per acre. Herbicides Karmex and Hyvar X are used in preplant applications; that is, once in 3 years at a total level of about 8 pounds per acre. These herbicides are fixed strongly in Hawaiian soils so that leeching is not expected. The volatile soil fumigant nematicides DD (40 gallons per acre) and BBC (3 gallons per acre) are also used in preplant application; that is, once in 3 years. We know of no data showing that pesticides from pineapple are present in surface or ground waters in significant amounts.

Fertilizer applications are based on analyses so that only what is needed by the plants is applied. Nitrogen, phosphorus and potassium plus minor elements are applied as required. Phosphorus is held very tenanciously in these soils so that leaching would not be expected. Of the nitrogen applied during the 3-year growing cycle, about 75 percent can be accounted for in the fruit and plant. Presumably a major portion of the remainder is consumed by soil microorganisms.

To the best of our knowledge, therefore, Dole's agricultural operations in the Pearl Harbor area do not contribute significantly to pollution of the waters. On the contrary, one would expect that carefully maintained agricultural land would be an asset since it provides area through which water can reach the aquifers. In contrast, urbanization leads to accelerated runoff rather than infiltration. Dole expects to maintain high standards of agricultural effeciency in the future and to continue cooperation with the Soil Conservation Service.

MR. STEIN: Thank you very much. Are there any questions?

The next speaker will be Mr. L. H. Herschler, representing the Oahu Sugar Company.

Mr. Herschler.

STATEMENT OF
L. H. HERSCHLER
OAHU SUGAR COMPANY
WAIPAHU, HAWAII

MR. HERSCHLER: Mr. Stein, conferees, ladies and gentlemen.

Oahu Sugar Company started its farming operations in 1897 and has continued the cultivation and milling of sugarcane without cessation since that date. Last year, Oahu Sugar Company acquired Ewa Plantation Company resulting in almost doubling the size of its cane acreage and sugar production. The cane lands are located adjacent to and above Pearl Harbor, principally West Loch.

These sugar operations were for many years the sole industry of any significance in the Waipahu-Ewa area and remain today the dominant and only major private industry in this area. Year-round employment at the highest agricultural wages in the world is provided for almost 1100 employees who receive subsidized housing (1000 houses), paid vacations and holidays, a non-contributory pension plan, sick leave, low cost medical services and other fringe benefits amounting to 35 percent of payroll.

The Company's gross income amounts to approximately $21 million a year, of which upwards of $1.3 million goes for State and Federal taxes. Employment costs including salaries and wages approximates $9 million which in turn provides additional State and Federal tax revenues. Many local stores and service oriented businesses in Waipahu-Ewa are dependent on the sugar generated income in the area for their continued operation.

Oahu Sugar Company has under its control some 35,000 acres of land of which about 19,950 acres are planted to sugarcane. Approximately 950 acres are owned in fee and the balance is leased land. The rental price of the leased cane land is probably as high, or higher than that paid for any comparable sized acreage of agricultural land in the world.

To serve these lands with needed irrigation water, our Company operates 26 pumping stations with 51 pumps and a gravity system that brings mountain water from the windward side of Oahu through the Koolau Range. Thirty-four pumps derive their water from artesian or basal sources, 14 pumps obtain water from the caproch and 3 pumps divert water from Waikele Stream. The yearly average of pumped water is about 195 million gallons per day and that of the gravity water about 32 million gallons per day, or a total of approximately 227 million gallons per day. Stated another way, the annual total approximates 82,850 million gallons or 254,258 acre feet of water. This is more than double the quantity of water furnished by the Honolulu Board of Water Supply for the Island of Oahu.

Essentially all of this water is used for irrigation with about 25.0 million gallons per day being largely recycled water which is first used for condenser cooling, mill processing and finally cane washing in the Waipahu and Ewa mills.

No cane trash or bagasse (fiber residue of the cane stalk) is discharged into Pearl Harbor or any of its tributaries. Bagasse is burned as fuel to produce steam and the rocks and cane trash are used for land fill. The principal problem insofar as water pollution is concerned is irrigation tailwater. This does not pose a problem for the Ewa fields as these are located on relatively flat lands where irrigation tailwater can be contained. The Waipahu fields, however, are located on sloping lands rising from sea level to 1200 feet in elevation. Approximately 17 percent of these cane fields exceeds a slope of 6 percent with maximum slopes up to 25 percent or more.

In irrigating cane, it is necessary to convey the water to the last row of cane until such time as sufficient water has percolated into the soil. This inevitably results in some tailwater discharge [illegible] n be kept to a minimum through careful water handling by experienced and well-trained irrigators. For the higher or interior fields, the tailwater can be conveyed to lower or interior fields for reuse in irrigating. However, for the lowest fields, and those bordering gulches and the perimeter fields of Waipio Peninsula, the tailwater must be contained or treated in settling ponds before being discharged.

There are two problems relative to irrigation tailwater which need to be considered separately. One involves the cane wash water from the mill used for irrigation on Waipio Peninsula, and the other, the use of good quality water for irrigating the higher elevation fields.

At the mill, the cane wash water (about 16.5 million gallons per day) is passed through 36 cyclones which remove up to about 65 percent of the soil particles. These soil particles are then pumped as a mud slurry to settling ponds on Waipio Peninsula. After drying, this soil is used for land reclamation work. The cane wash water, after passing through the cyclones, is used for irrigation on Waipio Peninsula where most of the settleable solids settle out in the cane furrows. The tailwater at the ends of the fields, however, still contains a few percent of the settleable solids and suspended collodial material which imparts a reddish-brown color to the water. In the upper fields, the water which is of good quality initially, picks up fine soil particles as it passes through the furrows -- a reverse process to that which takes place with the cane wash water used for irrigation on Waipio Peninsula.

We are proceeding on an active program to eliminate these intermittent irrigation tailwater discharges by constructing sumps and/or containment ponds to hold the tailwater until it percolates into the soil and is aided by evaporation. We have found the initial sumps constructed for this purpose to be too small and we are now enlarging these and constructing new ones of greater capacity, usually with a loss of productive cane land. The holding capacities of those ponds vary in size from several hundred thousand gallons to almost 2 million gallons as required to meet the needs of the acreage served and to best utilize the topographic features of the site.

Four discharge points which formerly emptied into the Class AA waters of West Loch have been eliminated by deep ditching and diking with the combined discharge going into two large former "mud" settling ponds. One discharge point was eliminated by discontinuance of cane growing. Where feasible former discharge points have been or will be combined by field-edge diking and deep ditching.

Seventeen containment ponds have been installed to date of which five are to be enlarged either this year or during 1972. Seven ponds are under construction or scheduled for completion by October of this year. Construction of five ponds is scheduled for November-December of this year and the balance, eight ponds, are planned for 1972 when the cane fields involved are harvested.

In addition to the above, we are planning to install a dike or dam across Walker Bay in Waipio Peninsula to provide a combination stabilization pond and wild bird sanctuary. We believe this is necessary for our operations to provide adequate treatment for several tailwater discharges, natural spring flow drainage from the deep drains on Waipio Peninsula and for the small effluent flow from the "mud ponds." Providing a wild bird sanctuary is an environmental plus. The United States Navy has given us tentative approval for this project, but further approval will be required from State and Federal agencies before construction can begin.

We have a floor drain from our mill in Waipahu which is scheduled for correction by constructing a concrete sump and drainage system with a sump pump to discharge into our irrigation system.

Also, we are installing a 5.0 million gallons per day pump and pipeline to make possible the pumping of excess mill wash water to the "mauka" irrigation system. This will reduce the quantity of wash water going to the Waipio Peninsula which has given us some problems in the past during periods of rain or when sizeable acreages were on "ripening" or being harvested. The estimated cost of this project is $200,000.

There has been considerable concern expressed about the sediments brought down by the various streams entering Pearl Harbor. I would like to comment on this briefly with respect to the effect of sugarcane on this problem.

Our observations have been that sugarcane provides very good protection against soil erosion -- as good or better than almost any other type of crop. There are several reasons for this. Sugarcane is a 2-year crop and fields normally are plowed and planted but every 8 years. For intervening crops, the furrows are only reshaped with the root system remaining largely intact. Our cane is planted in furrows following the contours with typically 1 and 1/2 percent slopes. Within a few weeks after harvesting, the new cane will provide protection against runoff and within 4 to 6 months the cane will form a canopy over the field to protect soils against heavy downpours of rain. Because of the furrows, sheet runoff never occurs except possibly for short periods of time between harvesting and planting or ratooning.

Our soils have a high water intake capacity and runoff generally occurs only following very intense rains of say 2 inches an hour or more or after heavy rains on the order of 6 or more inches in 1 day. The rainfall retention value of cane fields is much greater, for instance, than uncultivated lands having natural cover. This is borne out by the runoff studies conducted at the Waialua Sugar Company on Oahu by the Federal Water Pollution Control Administration in 1968-1969.

It is interesting also to compare the runoff from cane fields with builtup residential areas. The various subdivisions which have been built in former company cane fields have drainage canals, designed to city and county of Honolulu standards, with flow capacities of 15 to 50 or more times that of the cane field drainage ditches they replaced.

In concluding, may I say that Oahu Sugar Company shares the concern of others about water pollution of Pearl Harbor and is willing to cooperate to the fullest extent possible within the limit of its economic capabilities. We are now embarked on a program of water pollution control, as

I have described to you today, we believe will enable us to comply with the State's water quality standards as set forth in Chapters 37 and 37-A.

MR. STEIN: Thank you very much. Are there any comments or questions?

We will now hear the statement prepared by the Hawaiian Electric Company, represented by Mr. John A. Rolfing, Jr., Manager of Special Projects for the company.

STATEMENT OF

JOHN A. ROLFING, JR.

MANAGER OF SPECIAL PROJECTS, HAWAIIAN ELECTRIC COMPANY

HONOLULU, HAWAII

MR. ROLFING: My name is John A. Rolfing, Jr., Manager of Special Projects for Hawaiian Electric Company.

I wish to discuss briefly the Hawaiian Electric Company's activities in connection with the operation of the Waiau powerplant located on the shores of East Loch in Pearl Harbor. This plant is located on 51.8 acres of land and consists of 8 steam electric generating units totaling 427,000 kilowatts. The first unit was installed in 1938, and the last unit went into commercial operation in 1968.

Salt water taken from East Loch is used for cooling all of the units except for the two small, oldest units which total 26,000 kilowatts. These two small units utilize fresh spring water for cooling.

The Waiau Station at present represents 49 percent of the total generating capability of the company and in 1970 generated 52 percent of the total kilowatt hours.

We have no plans for the installation of additional steam units at Waiau. During the next 10 years we plan to add 3 additional steam generating units at our Kahe Station, which is located adjacent to the open ocean, and 4 additional steam units at a fourth powerplant site, which we plan to locate adjacent to the open ocean.

All generating units on the Hawaiian Electric system are normally dispatched by an automatic dispatch computer at our Ward Avenue office. This computer allocates the system requirements to each generator so that each kilowatt of electricity is produced by the most economical machine. This system therefore normally loads the newest and largest units to their full capabilities since they are the most efficient units on the system. Thus, as new units are added to our system, the Waiau units will represent a smaller percentage of our total installed capability, and since the newer units will be more efficient (of the reheat design) they will generate a larger percentage of the system load, thus reducing the amount of power produced at Waiau.

JOHN A. ROLFING, JR.

On Tuesday morning, Mr. Russell Freeman referred to the phasing out of the Pearl Harbor Shipyard generating system, and when this comes about the load will be picked up on the Hawaiian Electric Company system and will result in a further lessening of the thermal load on Pearl Harbor.

I would now like to talk briefly about our utilization of water at Pearl Harbor and what we are doing to monitor the effects of this utilization.

Salt water from East Loch is taken into the plant and circulated through the condenser, where the temperature is raised, and the water is then discharged back into East Loch. No other measurable change occurs in the water during this process.

Other methods of handling waste heat from steam plants have been considered, such as cooling ponds and cooling towers. However, in this area of the world, where land is limited, humidity is high, and adequate quantities of freshwater required for cooling towers is not available, utilization of salt water in a once-through cooling system is the only practical method developed at this time.

Hawaiian Electric Company has a continuing monitoring program conducted by competent chemists and marine biologists. We have recently instituted a program of monitoring the effect that passing the water through the condenser has on plankton and other forms of marine life. Preliminary indications from the monitoring program show that passing the water through the condenser has only a minimal effect on marine life. As part of our monitoring program we have found that the oxygen content between inlet and discharge water is very slightly affected. Observations which have been made recently at the discharges of our Waiau plant indicate that marine life is flourishing in these waters.

There has been considerable interest in recent years on the part of marine biologists and other groups concerning the possibility of utilizing the waste heat from our powerplants for mariculture. During the latter part of 1970 our company worked with the State Department of Land and Natural Resources, Department of Planning and Economic Development, and personnel from the University of Hawaii to explore the possibility of the State's or other interested party's using the heat from the discharge water. There were indications at this time that experimental work by the Department of Land and Natural Resources might lead to the use of warm water for mariculture. We plan to explore further this potential use of the warm water discharge.

Hawaiian Electric Company plays a vital part in national defense. The Armed Forces (Army, Navy, Marines and

Air Force) located on Oahu are supplied the majority of their electrical needs from the Hawaiian Electric Company. During 1970 we supplied 513,420,000 kilowatt hours to the Armed Forces, and this represents 15.7 percent of the total kilowatt hour sales of Hawaiian Electric Company.

In accordance with the requirements of the Department of Health, Hawaiian Electric Company submitted a request for a zone of mixing for discharge from the Waiau plant in an application dated April 10, 1970. Since the only measurable change in our circulating water is the temperature, the application for zone of mixing was for thermal discharge only, as we know of no alternate, feasible means of reducing the discharge temperature of our circulating water so that it does not exceed 1½° F. over ambient.

In serving this community with adequate, dependable and economic power, Hawaiian Electric Company is conscious of the islands' environmental well-being, and has striven to protect it over the years. In 1969 we converted our downtown Honolulu plant to smokeless low-sulfur fuel oil at a cost of $800,000. This summer we completed conversion of our Waiau plant to low-sulfur oil, at an additional cost of $750,000. As new research and technology become available to us, we are committed to making improvements to our system which will result in maximum benefit to our environment.

DR. QUISENBERRY: Mr. Chairman, I might add that I admit on the record that the Hawaiian Electric Company applied for a zone of mixing. I held a public hearing for the zone of mixing, and because of the confusion in the information presented and some corrections to other information that I received, I recently made a decision to postpone the final decision regarding the request and asked that the Hawaiian Electric Company engage a consultant to make further estimates of this plan of possible cooling of their water by different means and to make a report back to the Department of Health in 90 days. So, when the consultants make their findings, I will be holding another public hearing after additional information has been received.

MR. O'CONNELL: Could you tell us what the temperature is in the water passing through the system?

MR. ROLFING: No, but the condensers at Waiau Plant were designed for approximately 10°.

MR. O'CONNELL: I notice that you have observations being made at the discharge locations indicating that marine life was plentiful. Is that a casual observation or is this part of a program of observation in the water to develop specific information?

MR. ROLFING: This is part of a continuing program for monitoring the life there.

MR. O'CONNELL: Was this part of the information that you submitted to the State to support your request for zone of mixing?

MR. ROLFING: Frankly, no. It was in 1970. These observations were just recently made and were not available at that time.

MR. STEIN: What did you say the design was, and what have you checked other than the design? Does it do what it is supposed to do? Is that what actually happens?

MR. ROLFING: The units at times are a lot heavier because the rising is slightly higher temperature, but they are within the design.

MR. STEIN: I understand that; but how much higher?

MR. ROLFING: I don't have the figures, actually. I can make it available for you.

MR. STEIN: Were you discharging water as just runoff over the ground on the surface, or underground?

MR. ROLFING: There are tunnels going out from the plant. We have 3 separate ones. The first separate one enters Pearl Harbor. In each case, we have concrete structures.

MR. STEIN: And how far does this discharge go before it enters the water?

MR. ROLFING: Approximately -- probably 2 or 3 feet.

MR. STEIN: In your salt water discharge into the bay of Pearl Harbor, how many gallons of water do you use a day for cooling?

MR. ROLFING: Well, I don't have the number with me at the moment, exactly. The design was for approximately 9/10 of 1,000 gallons per minute. How many would that be a day -- 426,000 gallons a day.

MR. STEIN: Well, I don't know if we can do it here, but here is the point. I think from your statement -- and let me make a point here for the people who are not familiar with the question of using cooling towers with salt water and freshwater. There is quite a bit of difference. It is really a question of, I guess, whether cooling towers will work with a plant designed for salt water.

One of the reasons given in Mr. Rolfing's statement was that freshwater in adequate quantities was unavailable. This 195,000,000 gallons a day for the cane operation is freshwater, not salt water. So, probably the Sugar Company has been able to find freshwater, and I guess your company hasn't.

MR. ROLFING: No, there is a difference in the utilization of water that we are talking of here. The cooling towers for the total plant would reach approximately 18,000,000 gallons per day total of freshwater which would be evaporated to the atmosphere and lost. This is the quantity that we are concerned with.

MR. STEIN: You are not concerned with supply? You said that adequate quantities of freshwater for cooling towers were not available. In other words, you never considered freshwater to feed the cooling towers.

MR. ROLFING: Freshwater could be taken from the city and county --

MR. STEIN: Or you could get it with pumping stations like the Sugar Company.

The point is that on an Island such as Hawaii or any of these Islands with the rapid run down, adequate freshwater is not available; this is your statement.

I think the Sugar Company has a large quantity of water furnished by the Honolulu Board of Water Supply for the Island of Oahu, and that is to run the sugar plant. The question here is: in the face of that, can we say freshwater is not available on the Island of Oahu for the plant? I just raise the question.

I have just one more point to make. Presumably, you are going into East Loch. The National Technical Committee put out specifications on temperature readings, took a temperature of this discharge. They have a degree and a half over National at least during the summer here in

Hawaii and -- if we are going to go 10 or not -- that is exactly what the National Specifications Technical Committee has put out for their recommendation.

I think we have had the problem stated before.

MR. ROLFING: This is why we were asking for a zone of mixing.

MR. STEIN: In other words, if you have a zone of mixing you can oxidize the degree and a half. In other words, you would estimate that -- I don't know -- you usually use the figure that 90 percent is going to be retained and 10 percent is going to be lost in the power industry. In other words, they would use 10 percent of the water. If they switched to freshwater they would net about 10 percent of the water they would use as compared to the salt water.

STATEMENT OF LARRY WANG, BOARD OF WATER SUPPLY

MR. WANG: My name is Larry Wang, Board of Water Supply. I am responsible for the demand water and about 100 percent of the Water Board water, and they have limited the amount of supply. In fact, let me see, there was a shortage at Pearl Harbor as one of the wells went dry. The draft in the Pearl Harbor region is rapidly approaching the total supply, and when you project things for 50 years in advance you are going to -- just going to get an estimate.

Our projections show that at the end of 50 years, a demand for water will exist. The supply available for the Island of Oahu may we think -- will have to look for other sources of supply.

This is something in the future. We hope that we can maintain it just as as we can. The department is determining new sources that we can find in the area.

MR. STEIN: I think what you are saying is very fine, but let me put this in. This is an old plant that is phasing out that question that you have here; and I think that Hawaiian Electric has indicated that through this putting their outfall in the ocean, which is designed to meet this problem. Those things were designed and determined years ago. So, in all candor, you cannot hold the company responsible for something that the regulatory people were not even thinking about 5 or 6 years ago.

MR. WANG: We have plans which right now we are developing for water in the Pearl Harbor area for servicing areas outside of Pearl Harbor that are desperately in need of water. We have need for water and we need it now.

I understand that if we want to present a written statement we can have 10 days to do so.

MR. STEIN: You may have 1 week.

MR. WANG: Thank you very much.

MR. STEIN: Mr. Rolfing, I would like to thank you, and I would like to say one thing on the basis of your statement here that you indicated that there is no marine damage. This is not what our scientists have found in other areas.

What we are facing is when you are using water for cooling systems -- or salt water for cooling in the Pearl Harbor area -- I don't know but what you just have an operation of running and taking in that water and running it through the condenser. We heard someone the other day at this hearing say that the plant was running the water through the heat and then dumping it out in vast quantities of water; and if this is the case, this has a very deleterious effect on the water -- the body of water.

Now this may or may not be the case here. Our scientists would be delighted to come out here and do the survey, but wherever they go they have found damage through the plant. You may want to comment one way or the other.

MR. ROLFING: I am not a biologist. I don't profess to know the anlysis of the water that is going through, but we did have a biologist that reviewed the discharge and commented that this water did no damage that he could tell.

MR. STEIN: That may be, but I think that the damage is present. This is something that we have to consider.

when we deal with this problem. And as I said to you before, this is something that I haven't learned because God knows when we were dealing with pollution 5 or 6 years ago, we didn't have to worry about that.

Thank you.

(The following letter and enclosure were submitted by Mr. Rolfing to be included in the record. The first letter is addressed to Mr. Murray B. Stein and is signed by J. A. Rolfing, Jr. The letter is dated September 23, 1971.)

"The following information is submitted to clarify the statements made in my testimony at the hearing on September 22, 1971, regarding Pearl Harbor.

"As stated in my testimony yesterday, we have eight generating units at the Waiau Station. Six of the 8 units utilize salt water for cooling purposes. These 6 units require 358,880 gallons per minute, or a total of 516,800,000 gallons per day.

"If we were to use closed-cycle, freshwater cooling towers to replace all of the cooling requirements at our Waiau Station we would require 18,000,000 gallons per day of freshwater make-up. The make-up water is required to replenish evaporative losses and other losses in connection with the operation of the cooling tower. This amount of freshwater would be lost to the atmosphere and would be therefore taken out of the artesian basin and not be available for domestic or industrial use.

"The attached letter from the Board of Water Supply of the City and County of Honolulu to Dr. Quisenberry, dated September 2, 1971, expresses their concern about this wastage of freshwater from the artesian basin.

"We sincerely appreciate having the opportunity to testify at the Pearl Harbor hearings, and we sincerely hope that this information will serve to clarify any questions

which you may have had following our testimony of September 22."

(The following enclosed letter is addressed to Mr. Murray B. Stein and is signed by George Yuen, Manager and Chief Engineer, Board of Water Supply. It is dated September 23, 1971.)

MURRAY STEIN
GEORGE YUEN

"At the recent Environmental Protection Agency enforcement conference on Pearl Harbor pollution, the installation of cooling towers and the development of additional fresh water for condensing at the Hawaiian Electric Company's Waiau plant were proposed in order to eliminate the thermal problem in Pearl Harbor. The Board of Water Supply is vitally concerned about this prospect.

"The Pearl Harbor area from Aiea to Waipahu is rapidly being urbanized. In order to meet requirements of growth, domestic water sources in this area must be developed.

"Groundwater draft in this area has been increasing over the last 30 years. Sugar plantations, military agencies, watercress growers, and public water supply presently use more than 240 mgd from this basin. Studies show that the total natural groundwater flux in this basin is about 200 mgd. In addition, there is a net of about 45 mgd of return irrigation water for a total groundwater flux of 245 mgd. Of this, 40 to 60 mgd emerges as spring flow over the entire area. There is evidence that the draft in the Pearl Harbor region in recent years has reached or is rapidly approaching the total supply. We are not sure whether we are overdrafting or maintaining equilibrium. The apparently wasteful spring flow is an anomaly that reflects the slowness in approaching equilibrium which characterizes groundwater systems. Indeed, we may already be mining water and this will result in increasing sea water encroachment over a period of time.

"While we are sympathetic to the desire of maintaining our environment in as natural a state as possible, we must nevertheless be concerned over the effects of losing a substantial amount of fresh water now developed in addition to that which could be degraded by sea water intrusion if fresh water cooling is considered as the alternative to the Hawaiian Electric Company's problem. The continuing need for fresh water on the island of Oahu is becoming increasingly acute as the island develops and grows and we are heavily dependent upon the Pearl Harbor basin as one principal source of supply.

"We are hopeful that some alternative approach can be followed which would make it unnecessary to use additional fresh water for cooling purposes. We realize that the decision you must make is a difficult one but we urge your serious consideration of the water need of Oahu as you weigh other factors involved."

BETTY SNOWDEN

MR. STEIN: We have a statement from Mrs. Betty Snowden, Chairman of the Alliance of Leeward Community Associations, and one from Friends of the Earth to be put into the record as though read.

STATEMENT OF

BETTY SNOWDEN

CHAIRMAN, ALLIANCE OF LEEWARD COMMUNITY ASSOCIATIONS

HONOLULU, HAWAII

MRS. SNOWDEN: My name is Betty Snowden, and I am Chairman of the Alliance of Leeward Community Associations. The Alliance is a council of the community associations in the western half of Oahu and today we represent the communities that border Pearl Harbor on Middle and West Lochs. These towns are Pearl City, Waipahu and Ewa Beach.

We support the efforts to clean up Pearl Harbor and look forward to the day when it will be clean enough to open it to the citizens for recreational purposes.

However, due to the reclassification of the waters in the lochs, the prior practice of discharging effluent is now diverted to open air oxidation ponds in Waipahu in what is described by local officals as a temporary interim measure pending acquisition of land and funds to construct and complete a facility for proper sewage control.

On Tuesday, September 14 it was publicly stated that the Navy approved a plan to offer the city a 40-acre tract of land in Barbers Point for a sewage treatment plant.

So as the temporary oxidation ponds do not continue to remain, or worse yet, multiply in number which can very well happen as we are presently the fastest growing district in the State -- we ask assistance in securing a commitment for a definite timetable for implementation of proper sewage control in the district. The communities should not be penalized with interim solutions.

AARON V. DYGART

STATEMENT OF

AARON V. DYGART

STATE CHAIRMAN, FRIENDS OF THE EARTH

HONOLULU, HAWAII

AARON DYGART: My name is Aaron V. Dygart. I am State Chairman of Friends of the Earth, an international environmental organization, with its Pacific Branch office at 1372 Kapiolani Blvd., Honolulu.

I appreciate this opportunity to testify, and welcome it as a step in the right direction. The Environmental Protection Agency is to be commended for recognizing the value of constructive contribution to its efforts from citizen environmental groups. One feels, too often, in dealing with the problems of the environment, that decisions have been made long before the participation of such citizen groups is sought. It was with some dismay that I noted that the State of Hawaii did not seek the participation of noted environmentalists from the citizen ranks, when it appointed the members of the Governor's Environmental Council earlier this month. The State is, however, to be commended for the action announced at yesterday's conference.

We now have all the requisites for a comprehensive plan which would be a model for the Nations:

1. We have a unique body of water, with a potential

of becoming an excellent example of not only reclamation but multiple use, Pearl Harbor. With its separate lochs, making natural use divisions, and with its reasonably fast recharge, due to a large contribution area, Pearl Harbor has the potential, well borne out by its historical productivity, of being an important part of our ocean food resources. The conditions for this productivity are natural conditions, which only require respect of the importance of this body of water.

2. We have the economic incentives to bring about this potential, with yesterday's action by the State, and with current action by the EPA.

Now we must see that the job gets done, and done right.

At present the effort is to build new treatment facilities in order of priority and to phase out inefficient facilities. Let us suggest that the problems from such an approach may very well add up to an overexpenditure to achieve the solution we are after -- a clean ocean, in its entirety about these Islands, including Pearl Harbor. We have an opportunity, now, to build a thoroughly up-to-date recycling system, encompassing the entire Leeward side, and Honolulu. Rather than overloading the Pearl City Plant with Forest Ridge sewage, only to need another plant down the line, with costly changes in the system and outfall construction, it may be more economically feasible, as well as more environmentally valuable, to begin such a system while we still have an opportunity and before numerous inefficient systems become outdated by unexpected growth. We would like to see such a system explored, with such future possibilities as freshwater reclamation and enhancement of local food production in inland and ocean waters.

MR. STEIN: We will now recess for dinner.

(Whereupon, at 6:30 p.m., the conference was recessed, to be reconvened this date.)

EVENING SESSION

7:30 p.m.

MR. STEIN: We will now reconvene. Is there anyone from the Life of the Land present? Mr. Hodges, Mr. Darrah?

STATEMENT OF
WILLIAM DARRAH
LEGAL STAFF, LIFE OF THE LAND
HONOLULU, HAWAII

MR. DARRAH: My name is William Darrah. I am now a full-time member of the legal staff of the conservation group, Life of the Land. I specialize in the area of water pollution abatement. I am speaking as an individual and as a representative of Life of the Land.

My statement is a relatively short one. I would simply like to make two major points and then supplement them with a limited number of requests to this board.

First, I welcome EPA's presence here. You are long overdue. For years since 1967 your program grant application audits have reflected a profound displeasure with Hawaii's water pollution abatement program. Last year the comments directed to the State included these:

"(Your) plan is rated poor at best -- it doesn't reflect progress or involvement in managing or directing water pollution control in Hawaii."

"None of the waters in Hawaii have been brought into compliance since the last report, which were previously in violation of the water quality standards."

"It is becoming ludicrous for FWQA to repeatedly outline what Hawaii must do to qualify for State Program Grant funds; and for the State to completely ignore all such comments. FWQA should either forward their grant allotment without comment or require the State to meet the grant as outlined by law."

All of Hawaii's waters are in a chronic state of degradation. Dr. Quisenberry has admitted under oath that 15 bodies of water and every single stream in the State are polluted.

I submit that the cause of this problem is criminal neglect on the part of those charged with enforcing the law. I also submit that that neglect continues today. Since Federal officials last convened here I allege that no significant progress has been made. The 1972 audit now being prepared will I believe support me in this regard. A secret agreement between State and Sugar, the State's definition of best practicable treatment as no treatment whatsoever, and a proposal for a revised implementation plan, with no accompanying explanation, which will in that area of Municipal Sewage-Oahu accomplish a 98 percent negation of the existing timetables have been the most significant acts by the State in the last months.

You have been told this is not an adversary proceeding. You assert that in fact it is; that you are only here because the State has failed to meet its responsibility under the law. If you in fact genuinely believe this, then I say to you, enforce. Be critical of those whose neglect has necessitated your visit. And be critical of as much as you can legally under Section 10 of the FWPC Act. Make your recommendations as sweeping as the law most liberally interpreted allows. I remind you that realistically we're not talking about oysters here. We're talking about people and problems -- and the roots of these problems -- a State government which has continually promised to enforce the law and a State government which has never enforced the law.

Yesterday Dr. Richard Marland made broad commitments to this board. These commitments reflect a great potential step forward. However, I personally remain skeptical. Dr. Marland who now suggests that he can guarantee adequate funds through the State legislature and related activities has never to my knowledge taken an active part in lobbying for such funds. On the contrary, in testimony before two Senate Subcommittees, Dr. Marland stated that in his opinion there was no pressing need for extensive funds; that in fact the problems of this State were greatly overstated. Nor are Dr. Marland's priorities purely environmental. He is, as a matter of public record, the author of the secret agreement which resulted in compliance deadlines for Sugar which EPA now finds unacceptable. He is also, as a matter of public record, the individual who attempted to force through the implementation plan revisions, without public hearings or any word of justification. Fortunately, a public hearing will be held affecting many of the dischargers in the Pearl Harbor Drainage Basin. But to this date, Dr. Marland refuses to comply with Mr. Ruckelshaus' order that any change be supported by a "clear and strong justification."

What I suggest is this. Assume that "slippage" as Mr. Nader calls it will occur. Assume that as the State has fallen 98 percent behind schedule it will inevitably do so again. And, as you do so assume, consider what this board can do to make legally binding in ironclad fashion for the State these commitments it has now given to you.

In that regard, I have the following two recommendations to make to this board.

I. Make perfectly clear those sanctions that this board and EPA in general has available under law and which can be levied against this State in the event that their progress in achieving that which they now have promised to perform does not occur in a continuing and timely fashion. Recognize that you are negotiating a contract with the State. And, as you are so contracting, and as your consideration is forebearance from taking that action which is now legally yours to take, delineate those powers which you now are not exercising. Make it perfectly clear that a default by the State relieves you of your commitment not to exercise your power; and that that power can be and will be exercised. Specifically pledge to do the following if Hawaii does not perform its part of the bargain:

1. Recommend Refuse Act prosecutions against any or all dischargers into Pearl Harbor. Include in these recommendations, recommendations for prosecution specifically against the municipality of Honolulu as is clearly proper under the case law pursuant to 33U.S.C. 401 et seq.

2. Deny some or all Federal funds for Hawaii for water pollution control programs and construction grants as is your lawful right under Section 7(f) and 8(b) (3,4, & 5) of the Federal Water Pollution Control Act as amended.

3. Refuse to certify applicants as being eligible for Federal Refuse Act permits because of their noncompliance

with water quality standards as is your right under 33 CFR 209, 131(d)(8). And, following that denial of certification, demand prosecution under the Refuse Act of any or all those dischargers who then clearly could never receive a permit.

4. Refuse to accept Hawaii's revised implementation plan for water pollution abatement because of failure to meet the requirements of the Ruckelshaus memoranda of April 11, 1971 and 18CFR 622 which implements into law that memo. Such refusal would throw at least 112 dischargers into violation of the Federal Water Pollution Control Act of 1956 as amended. (Most of these, of course, are already in violation.) At that point, issue 180-day notices to any or all of these dischargers, which is your right under Section 10 and in fact now seems to be as articulated by Mr. Quarles EPA policy.

These four alternatives are, of course, not the only alternatives. They would seem, however, to be the more significant. In voicing your willingness to undertake these actions we say to you that this board gains a certain credibility in the eyes of the State that it does not now have.

Once you establish that you are entering a contract with the State and that you are forebearing from undertaking significant actions in this State; that you have and are willing to use power, I would recommend that you take steps to insure that the State's offer be "firmed up." Make it more binding. Insert penalty clauses, liquidated damages provisions if you will. As I said, make their commitment ironclad. Suggestions in that area include:

1. Request that the Governor call the legislature into Special Session on October 1, 1971, so that it may immediately authorize the State to sell bonds to meet the total cost of Hawaii's sewage treatment facilities.

2. Request that the Governor and the legislature do their best to direct the State Employee's Retirement System to purchase $63.5 million worth of these bonds. This sum represents only 15 percent of the system's total value, yet such an exemplary investment would show that the public employees of this State believe in and are willing to invest in the Hawaii that employs them.

3. Require the State to establish binding and concrete deadlines for the successful sale of these bonds. This will insure that the funds will be quickly and readily available, and more important that EPA will have the ability to monitor the State's progress.

There are, of course, other possibilities. But at the moment those above would seem most appropriate.

My final request to this board is this. As you know, Hawaiian Electric is presently violating the Refuse Act by virtue of its 558 million gallon per day hot water discharge into East Loch of Pearl Harbor. In the past, we have presented extensive testimony alleging that hot water discharges into Pearl Harbor have significant deleterious effects on certain marine organisms, especially shellfish larvae. As you also know, the State is now proceeding on the assumption that the best practicable treatment for thermal discharges is no treatment whatsoever. Accordingly, we expect the State to allow Waiau to continue discharing without treatment. Such an action is, in our opinion, clearly unlawful.

I have in my hand a formal complaint against Hawaiian Electric-Waiau plant which requests prosecution under the Refuse Act. A copy of that complaint has not been sent to the United States Attorney because my intention here is to place sole responsibility for action on this board. If you are sincere in your attempts to remedy the problems we have here, it would seem that you will now do the following:

1. Request that Dr. Quisenberry issue a decision, as he has already pledged to do, by September 27 on the Waiau zone of mixing application.

2. If that decision is to allow Hawaiian Electric

to continue discharging without treatment, within 1 month, demand that the Justice Department in Washington or here proceed immediately in a civil action under the Refuse Act. This action would, I contend, both resolve the lengthy controversy as to what in fact constitutes "best practicable treatment," and as well, then provide a vehicle for remedying a pollution problem which the State refuses to confront.

In concluding, I can only express our sincere concern and the hope that this board can see through the handshakes and the backslapping and recognize exactly the unique nature of these proceedings. Once you do recognize that unique nature, you must then recognize the duty that you now owe to the people of Hawaii and to EPA. We ask simply that you assume that duty.

MR. STEIN: Thank you. Are there any questions or comments?

The next speaker will be Mr. William P. Mull, Vice-President of the Hawaii Audubon Society.

WILLIAM P. MULL

STATEMENT OF

WILLIAM P. MULL

VICE-PRESIDENT, HAWAII AUDUBON SOCIETY

HONOLULU, HAWAII

MR. MULL: The Hawaii Audubon Society wishes to congratulate all the participants in this conference. We applaud every effort to improve our environment, and certainly the elimination of pollution is basic to that end. Naturally pure water probably is as important to man as is pure air, and the potential benefits of this conference for the people of Hawaii is obvious. We wish to call attention, also, to certain nonhuman residents of Hawaii that should benefit from these plans and proposals.

The ponds and tidal flats in the western portion of Pearl Harbor comprise one area of Oahu that is of major importance to the survival of endangered native water birds like the Hawaiian stilt (ae'o) and the Hawaiian coot ('alae Ke'oke'o), as well as large numbers of migratory ducks and shore birds that spend 3/4 of their year on our islands. They are part of our living environment. Their survival and health is a visible measure of the healthiness of our environment -- like the canary in the coal mine.

Efforts by this conference to restore the Pearl Harbor area to one of natural environmental purity and beauty for the well-being of the people of Hawaii can and should be planned with a view to retaining and improving certain portions of the area as critical habitat for these endangered bird species and other wildlife forms that occur naturally in and around the water areas under consideration. We refer specifically to the mudflats and shallow-water areas at the upper end of West Loch, near the mouth of Waikele Stream; the temporary settling basins on Waipio Peninsula; the Walker Bay area; the old dry salt ponds on the western shores of West Loch; and the small ponds on Navy land on the Pearl City Peninsula.

The Navy is to be congratulated for their effective recognition of the larger, long-range values of important wildlife preserves within areas of Pearl Harbor under their jurisdiction. Already, they have set aside over 300 acres as wildlife refuge areas, and they are cooperating and consulting with the U. S. Bureau of Sport Fisheries and Wildlife and the State of Hawaii Department of Land and Natural Resources in the improvement of several of these specific areas, like the salt ponds on the western edge of West Loch and the pond area on the Pearl City Peninsula.

We hope that even more can be done. Recently, over 600 stilts have been observed to use these areas for feeding, breeding and shelter. This represents half the total population of our endangered Hawaiian stilt. Of particular importance are the Oahu Sugar Company settling basins on Waipio Peninsula, which support large numbers of stilts and which are instrumental in alleviating silt pollution in West Loch and Middle Loch. The basins are designed to settle out suspended silt and cane waste materials from mill wash water and irrigation water before it enters the waters of Pearl Harbor. The mudflat areas created in the basins in this process provide attractive feeding and shelter areas for the stilts. Continued construction and operation of such basins can serve the purpose of both antipollution and wildlife.

Related to the operation of the Waipio settling basins is a plan to use Walker Bay as a supplementary silt-and-mill-waste settling area to improve further the quality of water discharged into West Loch from Oahu Sugar Company operations. If carried out on an incremental basis, with one section at a time being filled in with silts and mill debris, this procedure would upgrade the quality of cane-operation water discharged into West Loch and, at the same time, ensure the continuing creation of desirable mudflat areas for stilts and other waterbirds for years to come. We urge serious consideration of this plan.

Another area of importance to the stilt and other waterbirds is the remnant of Pouhala Pond, between the Waipahu Dump and the housing area, and the surrounding acres of marshland. This area at one time provided feeding and shelter habitat for over 300 stilts. In recent years it has been threatened by expansion of the dump. Dozens of stilts and other waterbirds still use the area, and it too should be considered as an area worth restoring and preserving as a Pearl Harbor wildlife habitat. Ecologically, this freshwater marsh serves as a transition zone between dry land and the waters of the harbor. This is the kind of wetland habitat that has suffered so greatly here and on the Mainland to the detriment of ecosystems in adjacent tidal waters.

Native wildlife, consciously encouraged and protected in natural habitat preserves, will enhance the beauty and value of Pearl Harbor for the people for generations to come. Aside from the ecological implications and intricacies involved, of which our most astute scientists are only now becoming aware, the visible presence of this wildlife in Pearl Harbor will provide recreation and rejuvenation values for those thousands of citizens who need, occasionally, to escape the unnatural pressures of a civilization that seems determined to separate man from his natural environment.

We are as responsible for the future welfare of our natural environment as we are for the welfare of our fellow men. Water without fish, land without plants and air without birds generally indicates a sick or sterile environment. Man senses this and is poorer for it whenever life is missing where he expects to see it naturally. In our concern for the welfare of the oysters in the water, let us not neglect the welfare of the mangroves along the shore or the stilt flying over the loch. They are all important to the welfare of each of us.

MR. STEIN: Thank you very much. Are there any questions?

We will now hear testimony from Mr. Chapman Lam, Chairman, Conservation Committee, Hawaii Council of Diving Clubs.

CHAPMAN LAM

STATEMENT OF

CHAPMAN LAM

CHAIRMAN, CONSERVATION COMMITTEE

HAWAII COUNCIL OF DIVING CLUBS

HONOLULU, HAWAII

MR. LAM: Mr. Chairman, conferees, ladies and gentlemen.

The Hawaii Council of Diving Clubs, comprised of 11 sport diving clubs, has an overall membership of some 1800 sport SCUBA divers. As divers, we appreciate the value of our marine reefs and we are directly concerned about adequate protection of reefs in Hawaiian waters. While Pearl Harbor is not counted as one of our sport diving areas, the waters discharged into the sea from Pearl Harbor have a definite influence on the condition of surrounding coastal reefs, and these are part of our underwater recreation area.

From the observations of our divers, we would conclude that considerable change has taken place in the waters off Pearl Harbor in fairly recent years. As there are no baseline studies of the coral growth and marine life in the Pearl Harbor portion of Mamala Bay, we have no way of knowing when and to what extent the changes in the reef took place. We have seen, however, evidence of formerly extensive coral growth. There are now many desolate sections of dead coral. There are also places where once living coral is now covered with extremely heavy growths of long, green, streaming algae. It appears that the main factors leading to the degradation of the coastal reef have been the increasingly heavy discharge of silt and freshwater from the harbor entrance. We recognize that the harbor itself is not the original source of silt and freshwater, that these marine pollutants come from the land areas above Pearl Harbor where considerable land development and construction have taken place in recent years. We urge that effort be made to reduce the level of freshwater and silt runoff into the harbor, and their subsequent discharge into coastal reefs, as part of any attempt to effect pollution control in Pearl Harbor.

MR. STEIN: Thank you, Mr. Lam. Are there any questions or comments?

Our next speaker will be Sophie Ann Aoki, who is representing SCOPE.

SOPHIE ANN AOKI

STATEMENT OF
SOPHIE ANN AOKI
STUDENT COUNCIL ON POLLUTION AND THE ENVIRONMENT
WASHINGTON, D.C.

SOPHIE AOKI: My name is Sophie Ann Aoki. I am Hawaii's representative to a national advisory group of the Environmental Protection Agency, the Student Council on Pollution and the Environment, or SCOPE.

Last week our group was completely taken by surprise when Mr. Ruckelshaus dissolved the Student Council on Pollution and the Environment and established instead a youth advisory board to EPA. That change is significant and relates to the discussions of this conference.

Two months ago our region of SCOPE was told by SCOPE coordinators from Washington, D. C. that some SCOPE activities had been a cause of embarrassment to the Environmental Protection Agency and that a far more effective role for SCOPE to the Environmental Protection Agency would be that of an in-house advisory group -- a role that would prevent public statements by SCOPE that were contrary to those held by the Environmental Protection Agency. We would be allowed to input into Agency decisions before they were made, but once made SCOPE was to voice no public opposition to the decision.

SOPHIE ANN AOKI

The key to the preservation of the democratic process -- the right to public dissent and the advocacy of public pressure, is not merely absent now, but is officially denied citizens who joined SCOPE when it was publicized as an open citizen access to a governmental Agency.

I submit that one of the major defenses of citizens to administrative deficiencies in environmental management is that of dissent -- the right to demand reconsideration of a decision, revocation of a permit, or the reevaluation of information. In the end, it usually means the upholding of an adversary position, through some channel of redress, whether in the courts, the public arena, or appeal to other administrative agencies. SCOPE, or rather the newly established youth advisory board lacks all of this.

It is much like the President's Advisory Council on Environmental Quality, whose advice to the President is privileged and confidential. Thus the public never learns about environmental positions taken by the council but rejected by the White House. So the public position of the council becomes that of a spokesman for the Administration, rather than, as had been widely hoped a spokesman for the public, openly expressing views which might at times be at odds with the Administration's position and thereby using its prestige and public constituency as leverage to induce the

Administration to adopt sounder environmental policies.

This kind of policy direction in favor of administrative convenience, image, and politics is degrading. I emphasize this point because unfortunately the policy on SCOPE is not an isolated, but might be viewed as the logical but unexcusable, consequence of the day to day so-called "insider perspective" of the governmental official, who no matter how well-intentioned tends to lose sight of the public interest, and pursues instead a conciliatory even hands-off administrative policy.

The ground is then set for the interplay of administrative "discretion," regulatory cooperation with those to be regulated, and the negative constraints which familiarity and close dealing tend to breed.

In the case of the Water Quality Office of the Environmental Protection Agency, and the former Federal Water Quality Administration and the Federal Water Pollution Control Administration before it, the practices mentioned above are recorded in history, parts of which are cogently exposed in the meticulously documented, 2-volumed Nader Task Force Report on Water Pollution, titled _Water Wasteland_.

The report reminds the reader that the Federal role in water pollution control began on a temporary trial basis in 1948 and became permanent in 1956. Yet, as the report states, "its effectiveness to date can be concisely assessed by the virtual absence of any evidence that the 7 laws passed and more than 3 billion dollars spent by the Federal Government have reduced the level of pollution in any major body of water."

Of interest too in the report is that out of a total of 77 enforcement conference sessions (including reconvenings) in which the Federal Government had made cleanup recommendations up to February 1970, the Federal recommendations were adopted in their entirety at 18 sessions, substantially adopted in 47, and only partially adopted in 12.

Then too, the Federal Government first became involved in Hawaii's water pollution problems back in 1963. Then 6 years later, when the Federal Water Quality Administration was searching for "just one bucketful of water, anywhere, that we honestly could stand up and say we had improved," Hawaii had none to report.

So goes the record.

I am sure you will understand our frustration at the prior failures of Federal water antipollution efforts. For the sake of our waters I am sure you will understand too our request that you create a precedent at this enforcement conference, by thoroughly reviewing the testimony submitted to you by the State, the city and county, the Navy and industry: their plans for abatement, their implementation schedules, their budget estimates, their technical analysis of pollution problems; by explicitly delineating your mandates for the same, leaving no room for vague interpretations; by preventing "slippage" in the adoption of your recommendations.

There is no question that this conference has gotten off to a good start and that the State has advanced a commendable plan from the evidence presented. To ensure that this plan will be more than historical rhetoric 3 years from now, I submit seven recommendations to the board.

These recommendations are as follows:

RECOMMENDATIONS

1. That the Federal Government make available its share of the funds required by the State for its cleanup.

2. Specification by EPA that future approvals of the State's water quality plan be contingent in part on the following:

   a. The implementation program include not merely so many personnel position counts, but that the State staff each of the required or requested positions and;

   b. During the next 3 years, if that is what the board agrees to, the State's plan be closely surveilled and evaluated in terms of progress made to ensure completion of the plan by 1974.

3. We recommend that construction grant money be strongly used as an enforcement tool by EPA in accordance with the Federal Water Pollution Control Act, section 7(F) and 8(b) (3,4, and 5) and again, in a precedent move, deny Federal funds if the State's plans are not in accordance with EPA's wishes and further, that EPA use ever legal arm it has to induce the State to clean up its waters.

4. No zone of mixing should be granted by the State of Hawaii without testimony on that application by EPA.

5. The Federal Government deny, and not just in the area of water pollution, funds if State plans do not progress.

6. To the State we request adoption of sections in House Bill 69 submitted to the 1971 State House of Representatives, that refer to citizen suits in environmental damage such as the right of intervention and the standing to sue.

7. We recommend the board's attention and action on resolutions passed by the President's Water Pollution Advisory Board on their visit to Hawaii in June of this year. Specifically, we recommend Resolution 1 on electric power siting, Resolution 3 relating to the Federal Environmental

Pesticides Control Act and resolution dealing with water pollution from agricultural sources.

MR. STEIN: There being no further testimony, this conference will be recessed until 11:30 tomorrow morning, at which time we will reconvene, and we will give our conclusions and recommendations, and at that time, we will answer questions for the press.

(Whereupon, the conference adjourned until 11:30 a.m., September 23, 1971.)

EXECUTIVE SESSION

September 23, 1971

11:30 a.m.

MR. STEIN: This meeting is reconvened.

CONCLUSIONS AND RECOMMENDATIONS

The conferees have unanimously reached the following conclusions and recommendations:

1. Pollution subject to abatement under the Federal Water Pollution Control Act exists in the interstate and navigable waters of Pearl Harbor. This pollution is caused by waste discharges from municipal, industrial and Federal facilities, agricultural activities and urban development.

2. Measures taken thus far toward abatement of the pollution are inadequate to bring about its elimination within a reasonable period of time.

3. Delays being encountered in abating the pollution are caused principally by the complexity of the problem and the need for closely coordinated action by various levels of government and industrial establishments. However, recent formation of a Pearl Harbor Task Force by Governor Burns has assisted greatly in bringing about this needed coordination.

4. The first phase of the Honouliuli system (as

generally described in the report, "Water Quality Program for Oahu," dated July 1971) shall consist of the following units:

a. An adequately sized sewage treatment plant providing at least 85 percent BOD removal and continuous disinfection of the effluent;

b. An ocean outfall;

c. Interceptor sewer lines and pumping stations serving the following areas: Waiau-Pearl City, Kunia-Waipahu, Honouliuli, Iroquois Point, and Barbers Point.

5. The first phase of the Honouliuli system as described above shall be constructed by the city and county of Honolulu in accordance with the following schedule:

a. By December 31, 1971, all necessary State Health Department permits to be obtained, design to begin, and plant site to be acquired;

b. By November 1, 1972, financing arrangements for the entire first phase to be completed and bids for construction of initial units to be advertised;

c. By March 1, 1973, construction contracts for initial units to be awarded;

d. By October 1, 1973, construction contracts for all units of the first phase to be awarded;

e. By December 31, 1974 construction of all units of the first phase as described above to be completed.

6. The Navy sewage treatment facilities at Barbers Point Naval Air Station and Iroquois Point (Capehart) shall be abandoned, and these systems shall be connected to the Honouliuli system by December 31, 1974. In the interim the Navy shall identify and apply feasible operating procedures to upgrade the performance of existing treatment facilities at Barbers Point and Iroquois Point.

7. The city and county of Honolulu shall take the necessary action to exclude from the harbor the sewage presently reaching the harbor from the watershed of the Waikele Stream, in accordance with the following schedule:

a. By December 31, 1971 - A sewage disposal plan providing for irrigation or export from the watershed is to be selected;

b. By September 30, 1972 - A design is to be completed and necessary financing arranged.

c. By December 31, 1972 - The necessary site is is to be acquired, and bids for construction advertised;

d. By March 31, 1973 - All necessary construction contracts are to be awarded;

e. By December 31, 1974 - Construction is to be completed.

8. The Army shall defer initiation of construction of a new secondary sewage treatment plant at Schofield Barracks until December 31, 1971, to allow time for selection of a Waikele watershed plan as specified in paragraph 7 herein. If the plan selected requires a new Army plant, construction shall proceed immediately. Any sewerage project undertaken by the Army is to be consistent in scope and timing with the selected Waikele watershed plan and provide for payment by the Army of its pro-rata share of the costs of any joint facilities.

9. The Air Force shall, by July 1, 1973, complete design of an interceptor sewer project that is consistent with the selected Waikele watershed plan so as to permit abandonment of their existing Wheeler AFB treatment facilities. The Air Force shall complete construction of the project by December 31, 1974. In addition, the Air Force is to pay its pro-rata share of the costs of any joint facilities.

10. The city and county of Honolulu shall, by July 1, 1972, establish controls to prevent leaching

of pollutants from the Waipahu Dump into the waters of West Loch, and shall operate and maintain the Waipahu refuse disposal site so as to eliminate all other adverse environmental effects in a manner acceptable to the State Department of Health.

11. By December 31, 1971, the Navy shall develop a schedule to control vessel waste discharges into Pearl Harbor, shall provide for financing of such controls no later than July 1, 1972, and shall commence implementation of its schedule no later than September 1, 1972.

12. Erosion controls, as required by approved State-Federal water quality standards (Chapter 37A (6), State Public Health Regulations) shall be imposed on all State projects, and as a condition for issuance of all grading permits. It is also recommended that by July 1, 1972, the city and county of Honolulu amend its subdivision and grading ordinances to require that prior to issuance of permits, the permittee obtain a certification by the State Department of Health of the acceptability of the proposed erosion controls. It is further recommended that Federal loans and grants be withheld from housing, highway and other construction projects which do not provide for erosion controls satisfactory to the State Department of Health.

13. The Oahu Sugar Company shall, by December 31,

1971, submit to EPA and SDOH an acceptable program including a time schedule of actions leading toward a) the elimination of mill waste and tailwater discharges to Pearl Harbor or its tributaries, and b) control of soil erosion from their lands to the maximum feasible extent. This program shall be in full operation by December 31, 1974.

14. Major pineapple growers shall, by December 31, 1971 submit to EPA and the SDOH an acceptable program including a time schedule of actions leading toward the control of soil erosion from their Pearl Harbor watershed lands to the maximum feasible extent. This program shall be in full operation by December 31, 1974.

15. the State Department of Agriculture shall, in cooperation with the Oahu Soil Conservation District, by July 1, 1972, develop a plan for a major study of soil erosion from undeveloped lands in the Pearl Harbor watershed. The study is to be completed not later than July 1, 1974. The plan is to be acceptable to the State Department of Health and the Environmental Protection Agency.

16. By July 1, 1972, the State Harbors Division, Department of Transportation, shall conduct an investigation of existing and proposed underground oil transmission lines to determine whether leakage is occurring or threatened and develop a program for maintenance and replacement to elimi-

nate any hazards to water quality that exist.

17. By March 1, 1972, the State Department of Health shall identify and prescribe control requirements on thermal discharges to Pearl Harbor by the Hawaiian Electric Company so as to achieve compliance with the thermal water quality standards by December 31, 1974. The Navy is to control the thermal discharges from its powerplants in a manner commensurate with the foregoing requirements.

18. The State shall, by July 1, 1972, review all existing and pending permits for waste discharges to the Pearl Harbor watershed, and shall add conditions as necessary to achieve consistency with the recommendations of this conference.

19. A joint city and county, State and Federal Technical Review Group shall be formed by October 1, 1971, for the purpose of reviewing the design and operation of the Waipio oxidation ponds. The EPA shall provide administrative services to the group. This review shall be completed and a report prepared within 30 days thereafter and shall contain recommendations for any modifications found necessary to assure satisfactory operation of this facility with regard to safety, treatment efficiency, and nuisance control. The city and county of Honolulu shall implement these recommendations in the manner and time period

specified by the Technical Review Group.

20. The parties listed below shall supply to the conferees (or conferee, as the case may be), semiannual progress reports with respect to the recommendations contained herein and specifically as identified below; the first report to be submitted on December 31, 1971.

Reporting Agency	Subject of Report paragraph numbers
Navy	6, 11, and 17
Army	8
Air Force	9
City & County of Honolulu	5, 7, and 12
State Dept. of Agriculture	15
State Dept. of Transportation	16
Hawaiian Electric Company	17
Oahu Sugar Company	13
Dole Company	14

21. The State Department of Health and the Environmental Protection Agency shall cooperate with the Navy in monitoring the waters of Pearl Harbor, and shall make their studies available to the public.

22. The Environmental Protection Agency should provide all possible support to the Governor's Task Force on Pearl Harbor in reaching the goal of achieving a protected environment which provides the greatest benefits to all

people. Support through technical assistance, studies, appropriate cost-sharing and stimulation of other Federal Agencies to participate should be provided in coordination with the Task Force.

23. The State of Hawaii urges that the Administrator, Environmental Protection Agency, recognize the great discrepance between the amount of Federal grant funds needed by Hawaii to complete the sewage treatment facility construction schedule which has been set and the funds expected to be allocated under current formulae and appropriations. The Administrator should take all possible steps to accelerate Federal financial support for these much needed projects.

This concludes the conclusions and recommendations of the conferees. I think that you can see that we have specifically laid out a curriculum. We have a lot of homework to be done, but I am confident that if we do this, we are going to arrive at clean water in Pearl Harbor.

I want to assure you, speaking for ourselves and the State, that we are going to follow through on this. We have a resident office here, as you know, and we are going to try to make sure that these deadlines are met. If the EPA Administrator approves these recommendations, we will be following these recommendations through and see that both the spirit and the letter of the recommendations are met.

Given the magnitude of the problem here, I don't think that we can afford to be content with what is euphemistically known in the trade as "slippage," or generally known as falling behind and not cleaning up the environment.

At this point, we will entertain questions from the press, if there are any.

THE PRESS: What action, if any, will be taken if these recommendations are not met?

MR. STEIN: We have several courses of action. In industry, we can move on to the 1899 River and Harbor Act. That's a criminal section. Also, if an industry discharges into navigable waters it has to have a permit. The permit can either be granted or denied, and it's against the law to discharge now without a permit.

In the municipality, if there is a violation of the standards -- I think the recommendations are fully consistent with the Federal-State water quality standards -- we issue a 180-day notice. If that is not complied with, then we can go to court, or else we can call a public hearing and come up with recommendations. And again, after 180 days, if the hearing board's recommendations are not complied with, we can go to court.

However, I do think that we have come up with a program of reasonable requests. We have worked this out in close cooperation with the State, and I confidently expect that this conference will get rolling, and we will get compliance.

In my view, after listening to the testimony here for the past several days, and after having looked at your water pollution problem in Hawaii, including the Pearl Harbor area for many, many years, I don't think that the people in this State can afford not to do this. It's in their best interest.

THE PRESS: We have here a lot of timetables. Is it your feeling that all of these deadlines that are set can be improved upon?

MR. STEIN: Oh, yes. These are the outside dates. We would like to feel if possible that these dates can be beaten. But I think that we have a reasonable, tight schedule.

THE PRESS: Could we expect that the EPA would be pushing this timetable up?

MR. STEIN: If they are approved by our Administrator, I want to assure you that EPA is going to take this as our marching orders and our manual of arms. Our program is going to be devoted, in cooperation with the State, to see that these dates and deadlines are met.

THE PRESS: At this time, what do you think the chances are of coming up with this 55 percent share of the $127 million proposed by the State within the 3-year period? How long do you think it will take?

MR. STEIN: I believe that the proposal made by the Governor may make that a moot question, because the Governor is proposing that the State engage in prefinancing for reimbursement. I think that the appraisal of the Governor in proposing this prefinancing program probably is a realistic one and a step forward to get the program going and completed within the 3 years' time.

THE PRESS: How long do you think it will take the Federal Government to reimburse the State?

MR. STEIN: Again, I would have to make a judgment of what the Congress proposes to do. Unless the Congress appropriates funds, the funds are unavailable for reimbursement. It would be foolhardy of me to make the judgment of what the Congress is going to do.

I would like to point out that we have formulae set by statute for the allocation of the funds, once they are appropriated. So there is no administrative problem or executive problem in getting that money to you, if the Congress puts this out.

If there is a congressional administrative act, it will go very rapidly. As you know, this is contingent on Federal appropriations -- actions on which I don't think I can really speculate.

THE PRESS: The Agency does have some discretion on this type of program. Would you say that they would be in the running for any such large sums?

MR. STEIN: They would be in the running, but they are only one of the States that have this prefinancing. There are many laws at hand on the funds at the present time and the monies available. It is just a question of arithmetic, and certainly, they would be running as much as any other major city.

Are there any other questions or comments?

THE PRESS: Thank you very much.

MR. STEIN: Conferees will be available individually to answer any questions that other groups or citizens might have.

Thank you very much for attending. We really appreciate your interest.

This meeting is adjourned.

(Whereupon the conference adjourned.)

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OFFICE OF THE MAYOR
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

RICHARD K. SHARPLESS
MANAGING DIRECTOR

September 23, 1971

Mr. Murray Stein
Chief Enforcement Officer
Environmental Protection Agency
Washington D. C. 20460

Dear Mr. Stein:

Pearl Harbor Enforcement Conference

Per your request, we are transmitting a plan and schedule of implementation for the Honouliuli Sewer System. For the record, our acceptance of a three-year-plan schedule proposed by your agency is contingent on the following:

1. Title to a 40-acre treatment plant site on Barbers Point Naval Air Station by January 1, 1972.
2. Availability of Federal and State matching funds by January 1, 1973.

We wish to direct your attention to the construction schedule for Ewa Beach Sewage Pump Station which is intended to serve the Ewa Beach community and the Navy's Capehart Housing at Iroquois Point. Because of our prior experience of acquiring sites for pump station in urban areas, we do not think it is realistic to schedule the land acquisition phase for a period less than 12 months. Consequently, the proposed completion date of the station will extend beyond the three year plan by 6 months.

Also included with this transmittal is a report on the Honouliuli System as recommended by the City's Board of Advisers and the Oahu Water Quality Program.

Sincerely,

Richard K. Sharpless
RICHARD K. SHARPLESS
Managing Director

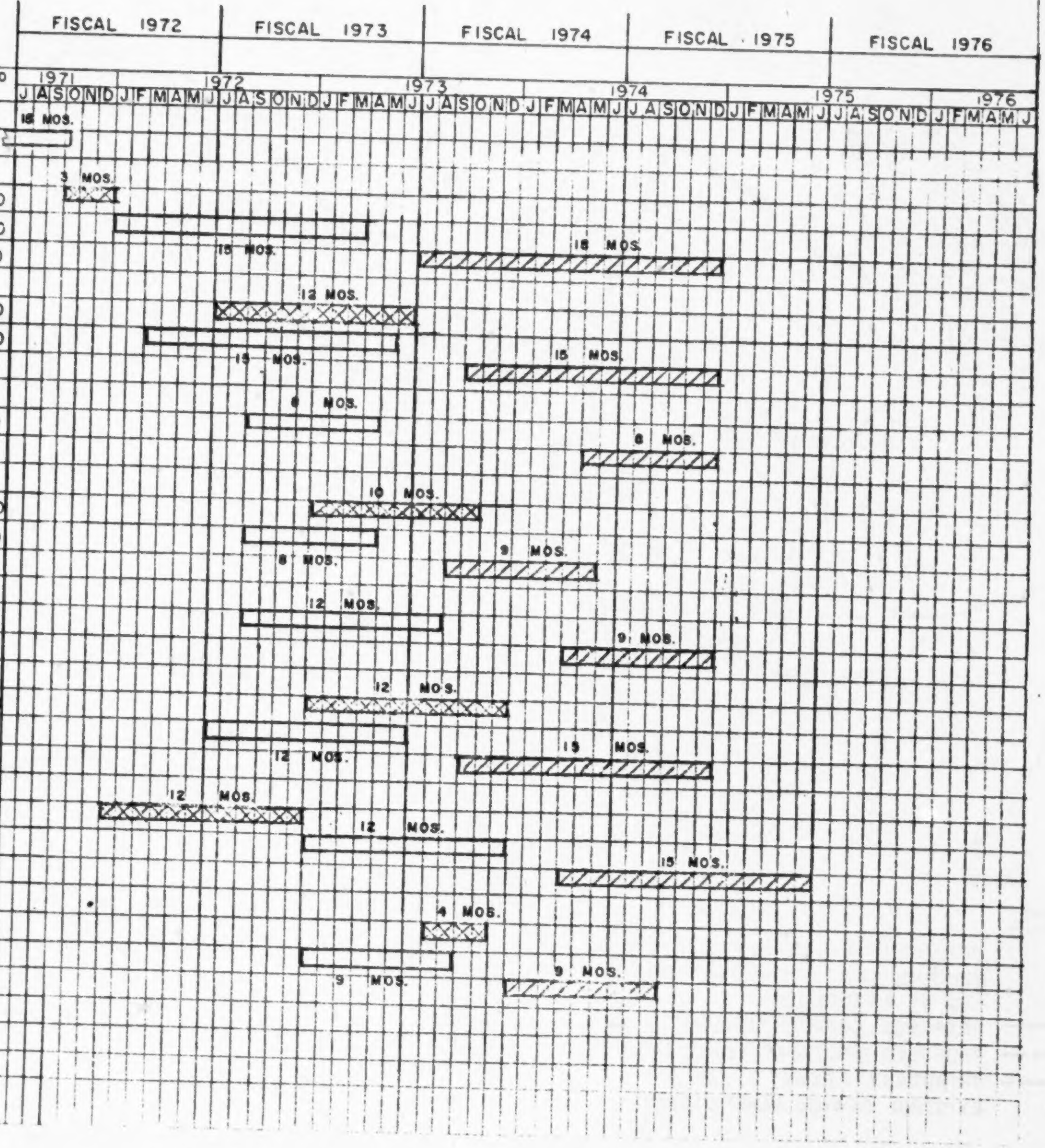
Enc.

DESIGN AND CONSTRUCTION SCHEDULE (TENTATIVE)

DIVISION OF SEWERS

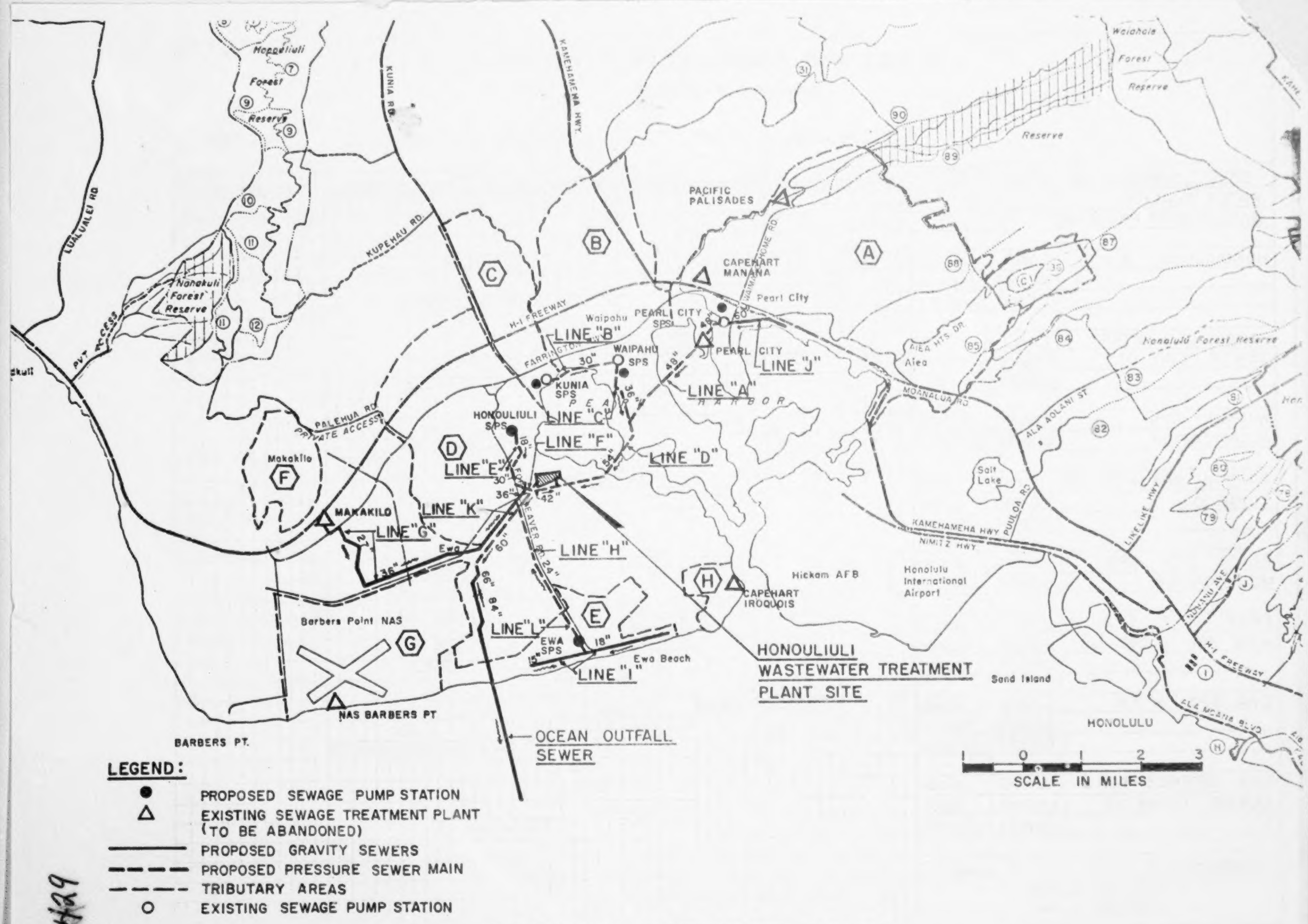
Revised 9/[illegible]

PROJECT NAME & TITLE	ACTIVITY	ESTIMATED COST
WATER QUALITY MANAGEMENT PROGRAM		
HONOULIULU WWTP	LAND	80,000
	ENGRG	810,000
	CONST	10,190,000
HONOULIULU INTER. SEWER (LINE D)	LAND	40,000
	ENGRG	260,000
	CONST	3,145,000
WAIPAHU SPS MODIFICATION	ENGRG	25,000
	CONST	246,000
WAIPAHU SPS, NEW FM (LINE C)	LAND	15,000
	ENGRG	45,000
	CONST	592,000
PEARL CITY SPS MODIFICATION	ENGRG	25,000
	CONST	253,000
PEARL CITY SPS, NEW FM (LINE A)	LAND	29,000
	ENGRG	390,000
	CONST	3,612,000
EWA SPS & FM	LAND	55,000
	ENGRG	170,000
	CONST	1,925,000
EWA INTERCEPTOR SEWER (LINE I)	LAND	6,000
	ENGRG	70,000
	CONST	1,040,000



LEGEND – ▭ – PLAN. & ENGRG.
▨ – CONST.
▩ – LAND

428


Honouliuli
Forest
Reserve
Nanakuli
Forest
Reserve
LUALUALEI RD
PVT ACCESS
KUNIA RD.
KUPEHAU RD.
KAMEHAMEHA HWY.
Waiahole
Forest
Reserve
PACIFIC
PALISADES
WAIMANO HOME RD
CAPEHART
MANANA
Pearl City
A
B
C
D
E
F
G
H
H-1 FREEWAY
Waipahu
PEARL CITY
SPS
FARRINGTON
LINE "B"
WAIPAHU
SPS
KUNIA
SPS
30"
36"
48"
60"
PEARL CITY
LINE "J"
LINE "A"
HARBOR
PEARL
Aiea
AIEA HTS DR.
MOANALUA RD
Honolulu Forest Reserve
ALA AOLANI ST
HONOULIULI
SPS
LINE "C"
LINE "F"
LINE "D"
54"
18"
PALEHUA RD
PRIVATE ACCESS
Makakilo
LINE "E"
30"
36"
42"
FORT WEAVER RD
24"
LINE "K"
MAKAKILO
LINE "G"
27"
36"
Ewa
60"
66"
84"
LINE "H"
Salt
Lake
KAMEHAMEHA HWY
NIMITZ HWY
PUULOA RD
LIKELIKE HWY
Hickam AFB
Honolulu
International
Airport
CAPEHART
IROQUOIS
Barbers Point NAS
LINE "L"
EWA
SPS
15"
18"
LINE "I"
Ewa Beach
HONOULIULI
WASTEWATER TREATMENT
PLANT SITE
Sand Island
H-1 FREEWAY
ALA MOANA BLVD
HONOLULU
NAS BARBERS PT
BARBERS PT.
OCEAN OUTFALL
SEWER
0
1
2
3
SCALE IN MILES
LEGEND:
● PROPOSED SEWAGE PUMP STATION
△ EXISTING SEWAGE TREATMENT PLANT (TO BE ABANDONED)
PROPOSED GRAVITY SEWERS
PROPOSED PRESSURE SEWER MAIN
TRIBUTARY AREAS
○ EXISTING SEWAGE PUMP STATION

8429

HONOULIULI WASTEWATER SYSTEM

THE HONOULIULI SYSTEM

GENERAL

This proposed system will serve the Pearl Harbor tributaries which extend from Halawa to Barbers Point. Practically all urban developments within these areas are presently sewered, except for several residential localities in the Ewa district.

Eight treatment facilities are presently situated and operated within this Study Area. A primary treatment facility at Pearl City, a trickling filter plant at the City & County Jail, a trickling filter plant for Pacific Palisades, an activated sludge facility at Makakilo, and an extended aeration plant at Nanakai are all operated by the City and County. The State of Hawaii operates an activated sludge treatment facility at the Animal Quarantine Station. In addition, the Navy operates and maintains treatment facilities at Capehart-Iroquois Point, and Barbers Point NAS.

Wastewater from these areas are essentially domestic with waste from the Primo Brewery being the only major industrial contribution presently.

RECOMMENDED WASTEWATER SYSTEM

The recommended system shown in Figure VII-9 proposes a secondary treatment facility initially at Honouliuli (herein called the Honouliuli STP) with reclamation of treated effluent for irrigation of cane in the Ewa area. An ocean outfall sewer located east of Barbers Point (herein called the Barbers Point outfall) will be ultimately constructed for disposal of excess effluent.

The following is recommended in order to effect a regional wastewater system.

1. That the Pacific Palisades and City & County Jail facilities be abandoned and wastewater from these developments connected into the City's sewer system, which presently terminates at the Pearl City Sewage Pumping Station.

2. That the Animal Quarantine Station, being a potential reclamation facility for turf irrigation, consider reclamation and/or disposal of effluent into the City's sewer system.

3. That the Pearl City sewage treatment facility also be abandoned in the future and raw sewage pumped from the existing Pearl City Pumping Station to the Honouliuli STP.

4. That the existing Kunia and Waipahu Pumping Stations be maintained and utilized to convey wastewater that terminates at these facilities, to the Honouliuli STP.

5. That pumping stations be constructed at Honouliuli and Ewa Beach area, when collection sewers are installed, to convey flows from these areas to the Honouliuli STP.

6. That the Navy's treatment facilities at Iroquois Point be abandoned and connected to the proposed City sewer system. Also that the Barbers Point NAS treatment facility either be abandoned and connected into the proposed City sewerage system or continue to be utilized with probable disposal of effluent via the proposed Barbers Point outfall.

7. That the Makakilo facility continue to be utilized until such time it becomes feasible to abandon the facility and convey wastewater from Makakilo City to the Honouliuli STP. It is noted that the Makakilo facility is a potential reclamation facility to provide irrigation water for adjacent cane lands. Under this plan, a line from the existing plant to the Barbers Point ocean disposal system could be constructed to effect an emergency means of effluent disposal for the reclamation plant.

8. That the Nanakai treatment facility continue to operate as long as the surrounding area remains agricultural.

9. That consideration for disposal of industrial wastes from the Campbell Industrial Park area (after treatment by the private concerns) be effected via the same proposed Barbers Point outfall. This would be the recommended method of handling the industrial wastes rather than consideration of treatment at the Honouliuli STP.

ESTIMATED POLLUTANT LOADS

1. Population Projections

Projections from Work Area 1 indicate that the population within this Study Area could probably increase from its present population of 100,900 to 379,900 by year 2020.

Population projections for the various tributaries within this Study Area indicate that present land use designations must undergo changes in the future to realize these projected populations. For areas 3, 5, and 6, where almost all usable lands are presently developed, it has been assumed that future population will be distributed more or less equally over the entire area. For areas 7 and 8 where land is available for development, future land use changes are assumed and population projected for these areas have been distributed as shown in Figure VII-9.

2. Waste Flow Projections

Studies covered in Work Area 2A indicate that the average waste flow per capita for the Pacific Palisades area is approximately 81 gpcd, with a dry weather infiltration of 5 gpcd into the sewers. Similar studies for tributary area 5, which includes Aiea, Waimalu, Waiau, and Pearl City, indicate an average waste flow quantity of 75 gpcd. Dry weather infiltration was determined to amount to approximately 43 gpcd.

Considering the similar type of terrain and development of tributary areas 3, 7, and 8, with area 5, an average daily waste flow of 75 gpcd is used. Dry weather infiltration of 5 gpcd is used for area 3 and 43 gpcd used for areas 7 and 8. It is anticipated that the waste flow quantity for all tributaries within this Study Area will increase to 85 gpcd by year 2020. An average of 2,000 gpad is used for wet weather infiltration.

Based on the above quantities, an average per capita flow of 77 gpcd which will increase to 85 gpd by year 2020, is used to determine the total wastewater flows for this Study Area. The estimated total wastewater loads to be handled by the Honouliuli wastewater treatment and disposal facilities are as indicated in Table VII-4 and shown in Figures VII-10 and 11.

3. Projected Solids Load

As determined in Work Area 2A, the average suspended solids in wastewater from these areas can be expected to be 0.16 lbs/capita/day. Based on this determination, the suspended solid loads are projected and summarized in Table VII-4 and plotted in Figure VII-11.

TABLE VII-4

ESTIMATED POLLUTANT LOADS

DESCRIPTION	1970	1990	2020
Population (thousands)	100.9	178.9	379.9
Average Per Capita Flows (gpcd)	77	78	85
Average Sewage Flow (mgd)	7.7	14	32.3
Dry Weather Infiltration (mgd)	3.5	6.8	15
Hawaii Brewery Flow (mgd)	.7	1.1	2.0
Barbers Point and Iroquois Pt (mgd)	2.0	2.0	2.0
Design Average Flow (mgd)	13.9	24	51
Design Max Hourly Flow (mgd)	23.2	36	69
Wet Weather Infiltration (mgd)	14	23	43
Design Peak Flow (mgd)	37.2	59	112
Average Per Capita BOD (lbs/day)	0.19	0.19	0.19
Total BOD in Municipal Sewage (1,000 lbs/day)	19.2	34.0	72.2
Total BOD from Military Flows (1,000 lbs/day)	3.8	3.8	3.8
Total BOD from Hawaii Brewery (1,000 lbs/day)	3.0	4.6	8.3
Total BOD (1,000 lbs/day)	26.0	42.4	84.3
Average Per Capita SS (lbs/day)	0.16	0.16	0.16
Total SS in Municipal Sewage (1,000 lbs/day)	16.1	28.6	60.8
Total SS from Military Flows (1,000 lbs/day)	3.2	3.2	3.2
Total SS from Hawaii Brewery (1,000 lbs/day)	1.6	2.4	4.4
Total SS (1,000 lbs/day)	20.9	34.2	68.4

Notes:
1. Estimated population for Barbers Pt is 3,100 people and Iroquois Point is 4,800 people. Flows shown for these facilities reflect plant capacity.
2. Military BOD and TSS loads based on 0.19 lbs/day and 0.16 lbs/day respectively (design population derived from 100 gpcd)
3. Brewery loads are estimated average loads.

CONSIDERATIONS FOR THE COLLECTION AND TRANSMISSION SYSTEM

The proposed system will include five major collection points with pumping stations to convey sewage to the Honouliuli STP.

The Pearl City Pumping Station is the focal point of all wastewater from Aiea, Waimalu, Waiau, and Pearl City. This station will pump waste via pressure mains "A" and "D" to the Honouliuli STP. The Kunia Pumping Station will serve the Waipahu-Kunia area and continue to convey waste to the Waipahu Pumping Station. The Waipahu Station will also collect wastewater from the Waipahu-Waiawa area and pump waste to the Honouliuli STP via pressure mains "C" and "D".

The routing of pressure mains across Middle Loch, through the Waipio Peninsula and across West Loch to the Honouliuli STP, could probably involve a slightly higher cost than an overland route along the coast. However, this route was selected because of several reasons.

1. Anticipated greater problems in acquiring right-of-way for a coastal route in comparison to the peninsula route. Right-of-way problems could delay implementation of this system. Preliminary indications are that obtaining right-of-way from the Navy is feasible in the peninsula area.
2. Preliminary studies for creation of an "energy corridor" (to be used for installation of high pressure fuel lines), favor a probable 30-foot wide corridor along the existing railroad right-of-way in the Kunia-Waipahu-Waiawa areas. This would present further constraints in obtaining suitable right-of-way for a sewer along these coastal areas.
3. A coastal route would probably involve more construction and maintenance problems, especially if lines must be installed in the low lying, flood plain areas along the coast.

The three pumping stations mentioned above are existing facilities built in the 1960's and are presently in good condition. Implementation of the proposed system will require no initial modification to the Kunia Pumping Station. The Pearl City and Waipahu Pumping Stations will possibly require new pumping units and modifications because of much higher head conditions imposed by the new system.

The proposed Ewa Pumping Station should be designed to handle flows from the Ewa Beach area, and the inclusion of flows from the Navy's Capehart Housing at Iroquois Point.

The Honouliuli Pumping Station should be designed for collection of wastewater from existing homes in this area and probable future developments within this vicinity.

If not desirable as a potential wastewater reclamation facility, the Makakilo STP and Nanakai STP should be phased out in the future and wastewater conveyed to the Honouliuli STP via gravity sewer "G". This line should also be designed for possible inclusion of wastewater from the Barbers Point NAS.

Effluent from the Honouliuli STP would be pumped via pressure main "K", then flow by gravity through line "L", to the ocean outfall sewer off Barbers Point NAS.

CONSTRUCTION SCHEDULE AND ESTIMATED COSTS

The construction staging as shown in Table VII-6 is based on the following assumptions.

1. That the first increment of the Honouliuli STP will be designed for 13 mgd.
2. That the existing Pearl City and Waipahu pumping systems will be modified with the first increment of this treatment plant.
3. That the unsewered areas of Ewa Beach will be sewered by 1980.
4. That the Honouliuli area may be developed after 1975.
5. That the Makakilo STP will continue to be operated until 1975.
6. That the existing Kunia, Waipahu, and Pearl City Sewage Pumping Station structures will be adequate until flow reaches its original ultimate design capacities of 8.8 mgd, 20 mgd, and 40 mgd, respectively.

The estimated costs shown in Table VII-6 are present day construction costs and have not been escalated for the actual year of construction.

It is noted that the proposed first increment requires construction of the pressure main from the Pearl City and Waipahu Pumping Stations to the treatment plant at Honouliuli. Pumping of the relatively small existing raw waste flows through this large pressure main could conceivably result in problems of solids settlement, septicity, and odor. If desirable, an interim system can be considered to reduce the probability of such problems. The following is recommended.

1. An oxidation pond can be constructed at the existing Pearl City treatment facility to provide secondary treated effluent.
2. The oxidation pond (presently being constructed) in Waipio Peninsula to treat waste from the Waipahu SPS can be maintained to provide secondary treated effluent.
3. Effluent from both these oxidation ponds be pumped via the proposed pressure main to a holding pond, at the proposed Honouliuli STP site, from which it can then be pumped to the plantation irrigation system for irrigation of cane.

Such an interim system could be utilized until such time that waste flows increase sufficiently enough to pump raw waste through the pressure main without causing considerable operational and maintenance problems. This would in addition make possible shifting the time table for construction of the Honouliuli Plant and extend the use of existing Pearl City Primary Treatment Plant.

TABLE VII-6

CONSTRUCTION SCHEDULE AND ESTIMATED COST FOR HONOULIULI WASTEWATER SYSTEM

DESCRIPTION	ESTIMATED COST (in thousand dollars)				
	1971-1975	1975-1980	1980-1985	1985-1990	1990-2000
1. TREATMENT FACILITIES					
a. Secondary Treatment (13 mgd) incl Sludge Incineration Facilities	7,600				
Effluent Pond, Pumping System and Pressure Main	2,300				
b. Add Secondary Treatment Facilities (13 mgd)		3,300			
Add Effluent Pond and Pumping Units		400			
c. Additional Primary Treatment Facilities (25 mgd)				3,600	
2. EFFLUENT DISPOSAL LINE					
Line K				1,400	
Line L				3,170	
Ocean Outfall Sewer				5,350	
3. SEWERS					
Line A	2,960				
Line B - Relief Sewer			700		
Line C	580				
Line D	2,510				
Line E		180			
Line F		380			
Line G		2,980			
Line H		870			
Line I		850			
Line J - Relief Sewer			920		
4. PUMPING STATIONS					
Pearl City - Modify exist. (40 mgd)	200				
Add new station (19 mgd)					850
Kunia - Add new station (7 mgd)					630
Waipahu - Modify exist. (20 mgd)	200				
Add new station (13 mgd)					750
Ewa - New station (9 mgd)		680			
Honouliuli - New station (17 mgd)		820			
TOTAL (Items 1, 2, 3, & 4)	16,350	10,460	1,620	13,520	2,230
30% Adm, Engr & Contingency	4,910	3,140	490	4,060	670
TOTAL	21,260	13,600	2,110	17,580	2,900

Costs shown are present day costs.

ERRATA SHEET

Conference in the Matter of Pollution of the Navigable Waters of Pearl Harbor and its Tributaries - Hawaii, held September 21, 22, 23, 1971, Honolulu, Hawaii.

The following letters to Murray Stein, dated September 23, 1971, from John A. Rolfing, Jr., and George Yuen should be appended to the above-mentioned conference proceeding.

HAWAIIAN ELECTRIC COMPANY, INC.
Box 2750 / Honolulu, Hawaii / 96803

September 23, 1971

Mr. Murray B. Stein
Chief of Enforcement
Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Stein:

The following information is submitted to clarify the statements made in my testimony at the hearing on September 22, 1971, regarding Pearl Harbor.

As stated in my testimony yesterday, we have 8 generating units at the Waiau Station. Six of the 8 units utilize salt water for cooling purposes. These 6 units require 358,880 gallons per minute, or a total of 516,800,000 gallons per day.

If we were to use closed-cycle, fresh-water cooling towers to replace all of the cooling requirements at our Waiau Station we would require 18,000,000 gallons per day of fresh-water make-up. The make-up water is required to replenish evaporative losses and other losses in connection with the operation of the cooling tower. This amount of fresh water would be lost to the atmosphere and would be therefore taken out of the artesian basin and not be available for domestic or industrial use.

The attached letter from the Board of Water Supply of the City & County of Honolulu to Dr. Quisenberry, dated September 2, 1971, expresses their concern about this wastage of fresh water from the artesian basin.

We sincerely appreciate having the opportunity to testify at the Pearl Harbor hearings, and we sincerely hope that this information will serve to clarify any questions which you may have had following our testimony of September 22.

Very truly yours,

J A Rolfing Jr

J. A. Rolfing, Jr.
Manager, Special Projects

Enclosure

cc: Dr. Walter Quissenberry
Mr. Richard O'Connell

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BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

September 2, 1971

Dr. Walter B. Quisenberry
Director of Health
State Department of Health
P. O. Box 3378
Honolulu, Hawaii

Dear Dr. Quisenberry:

At the recent hearing concerning discharge of cooling water from Hawaiian Electric Company's Waiau Station into surrounding coastal waters, we understand that if such a practice were to terminate the Hawaiian Electric Company would be required to install cooling towers and to use fresh water for cooling purposes. We were informed by the Hawaiian Electric Company that this method will result in the loss of the cooling water to the atmosphere.

While we are sympathetic to the desire of maintaining our environment in as natural a state as possible, we are nevertheless very concerned about the prospect of losing a substantial amount of water which could be used for potable purposes. At present, the Waiau well system is capable of providing from 10 to 15 million gallons a day of potable water. If cooling with fresh water becomes necessary, the quantities required at peak periods would be considerably in excess of present flows. Withdrawals of this magnitude from the ground water basin would very likely adversely affect wells located mauka of the Waiau wells.

For the past several months we have been meeting with officials of the Hawaiian Electric Company in an effort to arrive at an agreement whereby the Board of Water Supply will be able to utilize the Waiau well water. In addition to the possibility of direct diversion of the water into our distribution system, the other alternative of drastically curtailing flows from the Waiau wells would strengthen the Pearl Harbor ground water basin considerably.

The continuing need for fresh water on the island of Oahu is becoming increasingly acute as the island develops and grows, and we are heavily dependent upon the Pearl Harbor basin as one principal source of supply.

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We are hopeful that some alternative approach can be followed which would make it unnecessary to use the Waiau fresh water for cooling purposes. We realize that the decision you must make is a difficult one but we urge your serious consideration of the water needs of Oahu as you weigh the other factors involved.

Very truly yours,

George Yuen

George Yuen
Manager and Chief Engineer

cc: Dr. Richard Marland
Mr. Lewis Lengnick
Mr. Frank Montgomery

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA
POST OFFICE BOX 3410
HONOLULU, HAWAII 96801

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FUJIO MATSUDA
STANLEY S. TAKAHASHI
ALBERT C. ZANE

GEORGE A. L. YUEN
Manager and Chief Engineer

September 23, 1971

Mr. Murray B. Stein
Chief of Enforcement
Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Stein:

At the recent Environmental Protection Agency enforcement conference on Pearl Harbor pollution, the installation of cooling towers and the development of additional fresh water for condensing at the Hawaiian Electric Company's Waiau plant were proposed in order to eliminate the thermal problem in Pearl Harbor. The Board of Water Supply is vitally concerned about this prospect.

The Pearl Harbor area from Aiea to Waipahu is rapidly being urbanized. In order to meet requirements of growth, domestic water sources in this area must be developed.

Groundwater draft in this area has been increasing over the last 30 years. Sugar plantations, military agencies, watercress growers, and public water supply presently use more than 240 mgd from this basin. Studies show that the total natural groundwater flux in this basin is about 200 mgd. In addition, there is a net of about 45 mgd of return irrigation water for a total groundwater flux of 245 mgd. Of this, 40 to 60 mgd emerges as spring flow over the entire area. There is evidence that the draft in the Pearl Harbor region in recent years has reached or is rapidly approaching the total supply. We are not sure whether we are overdrafting or maintaining equilibrium. The apparently wasteful spring flow is an anomaly that reflects the slowness in approaching equilibrium which characterizes groundwater systems. Indeed, we may already be mining water and this will result in increasing sea water encroachment over a period of time.

While we are sympathetic to the desire of maintaining our environment in as natural a state as possible, we must nevertheless be concerned over the effects of losing a substantial amount of fresh water now developed in addition to that which could be degraded by sea water intrusion if fresh water cooling is considered as the alternative to the Hawaiian Electric Company's problem.

The continuing need for fresh water on the island of Oahu is becoming increasingly acute as the island develops and grows and we are heavily dependent upon the Pearl Harbor basin as one principal source of supply.

We are hopeful that some alternative approach can be followed which would make it unnecessary to use additional fresh water for cooling purposes. We realize that the decision you must make is a difficult one but we urge your serious consideration of the water need of Oahu as you weigh other factors involved.

Very truly yours,

George Yuen

George Yuen
Manager and Chief Engineer

cc: Mr. Richard O'Connell
Dr. Walter B. Quisenberry
Mr. L. Russell Freeman
Dr. Richard E. Marland
Mr. John T. Humme
Admiral Haywood